

APPENDIX 4J

**DETAILED VENUE
ANALYSIS: MCMAHON
STADIUM**

CALGARY BID EXPLORATION COMMITTEE

VENUE BRIEF:

McMahon Stadium:

PROPOSED Opening and Closing Ceremonies CALGARY, ALBERTA, CANADA

PREPARED FOR

CALGARY BID EXPLORATION COMMITTEE, Master Facilities Plan

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DATE

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INTRODUCTION

As part of an exploratory exercise to determine the feasibility of Calgary presenting a bid to host another Olympic and Paralympic Winter Games, a high level survey and study was conducted to review potential major competition and non-competition sites. One of the primary components of the exercise was to look at where there were synergies between venues and maximize existing infrastructure and transportation links/corridors.

The McMahon Stadium has been identified as the potential site for Opening and Closing Ceremonies for both the Olympic and Paralympic Games. The Calgary Bid Exploration Committee (CBEC) identified McMahon Stadium, which was used as the Opening and Closing Ceremonies venue at the 1988 Winter Olympic Games, focusing on the concept that by using existing infrastructure, the venue provides substantial efficiencies in operations readiness, time, and costs.

The information contained in this document is to provide the Calgary Bid Exploration Committee (CBEC), Facility Owners, and Planning Teams further information on venue use, spatial requirements, and any challenges that need to be explored regarding this venue.

PROPOSED SCOPE & WORKING ASSUMPTIONS

McMahon Stadium has been proposed as a non-competition venue, hosting the following events:

Events: Opening Ceremonies (Olympic and Paralympic)
 Closing Ceremonies (Olympic and Paralympic)

Throughout the exploratory discussions the following working assumptions have been applied:

- Venue gross seating capacity meets a minimum of 40,000 to 55,000 seats;
- Seating bowl is code compliant and meets best practice for accessible and amenity seating. Any additional seating required to meet venue capacity to be provided for through temporary infrastructure;
- Full use of venue is available for Olympic and Paralympic use including external compounds, parking, and all ancillary spaces. Shared or exclusive use periods to be determined during venue use agreement planning phase;
- Venue is located within an operating sports complex, secure perimeters, vehicle and pedestrian screening, transport operations, and other amenities and services are required and will alter current access, use, and movements of the venue and surrounding areas;
- Parking lot surfaces are flat and proper drainage for surface water, and are free from holes, cracks and large uneven surfaces;
- Lighting levels meet Olympic Games Broadcast requirements, see Appendix A;
- Audio systems do not meet Ceremonies requirements, modifications may be required;
- Roof structure has the capacity to hold additional loads for additional lighting and audio, cameras, flags, look banners and/or dimensional rings, video boards, control booths, and aerial systems and platforms;
- Toilets are code compliant and meet all accessible guidelines and best practice;
- Concessions are in good working condition with all services operational, code compliant, and accessible;
- Interior HVAC systems are fully operational and able to meet games requirements for temperature or is feasible for modification;

The material below is a non-exhaustive listing of the major areas and will act as a preliminary benchmarking tool when assessing the overall venues ability to operate as the Opening and Closing Ceremonies venue. Using this material will provide the information needed to complete the next series of space studies to confirm flows, functional area space allocation, and develop further confirmation of required permanent works necessary.

As part of the sports complex, there needs to be further dialogue around the overall site access, egress, vehicular flows and Security Footprint, but as an initial phase of work the brief below will advise as to baseline requirements. There is minimal reference to the interior spatial requirements for the ceremonies venues as most of the facilities have the primary requisites within their standard operating design, any gaps observed are noted at the end of the document for consideration. Further information on the Ceremonies and Media requirements will come later in the process.

CEREMONIES BASELINE REQUIREMENTS

1 | General Venue Use

The Organizing Committee Olympic Games (OCOG) will need to take possession of the venue and its surrounding site areas to allow sufficient time for build out and overlay works. Build out requirements are based on the number of compounds, cabling requirements, and overall build scale and complexity.

A typical build out duration for a Ceremonies venue is approximately 12 weeks prior to athlete training start, this includes venue lock down, ceremonies and technical rehearsals, and hand over to the games time operations team. Some non-exclusive access for base structures and connections may require isolated works to commence 9 months prior to Opening Ceremonies.

Coordination between venue owner and the OCOG is required to confirm non-exclusive use and exclusive use periods to allow for games build out, games operations, and remediation of the venue and site post games. Opening and Closing Ceremonies are part of both the Olympic and Paralympic program, which requires transition works between all ceremonies.

This transition includes works to the FOP or Stage areas, along with other minor venue elements. Remediation works to commence at the end of Closing Ceremonies of the Paralympic Games.

Full use of the venue is required, including all exterior compounds, parking, facility and maintenance areas, suites, food service areas, retail outlets, storage areas, locker rooms, offices, and all operational spaces necessary to operate during the games.

2 | Front of House (FOH) Program Requirements

Front of House (FOH) areas are where spectator access, circulation, accommodations, and event viewing spaces are provided. FOH operations include spectator entry points, ticket scan, circulation concourses, concessions, ticket resolution, spectator services and information, retail outlets, toilets, water stations, spectator medical, and access to spectator seating and competition viewing areas.

The main entry and exit at the venue happens in the FOH through a secure venue perimeter fence line, spectator security screening, and ticket rip operations. Venue entry and exit points will be determined through crowd modeling exercises with the city transportation teams and surrounding sports complex to established through put rates to ensure optimal spectator flows around the venue and load-in of spectators to the stadium for Ceremonies. Parking that is currently provided for spectators will be used for Games operations and compounds and will not be available, all spectators will arrive through other means of transportation or parking options, these transportation plans will be established by the city and OCOG transportation teams.

General considerations for the front of house include providing spectator toilets and seating to meet best practices in accessibility, amenity seating, toilets, and concessions to ensure all spectators are able to enjoy the games without limitations. A thorough review of the venue's accommodations needs to be completed to determine where improvement works may be necessary to accommodate best practice and code compliance for an international sporting event.

FOH areas optimally occur in existing spaces, however, there may be a requirement for additional spectator spaces to be provided to meet operations and games planning

requirements. These spaces would be provided through temporary infrastructure in the spectator plaza's, entry spaces, and concourses. Internal space allocation and the requirements for external temporary spaces will be confirmed in the next phase of the venue confirmation and detailed planning.

a. FOH External Program Requirements

i. Venue Perimeter

A secure venue perimeter fence line is required around the full perimeter of the venue, including compounds and entry plaza's. Depending on the security threat level at the time of the Games, this perimeter fence line may be a double fence system with a footprint of approximately 3m in depth. The fencing would be ballasted to ensure stability in the event of heavy winds, and may be engineered as part of a vehicle mitigation system. The fence will be covered in fence fabric with the look of the games applied, and entry and egress points.

ii. Ticket Box Office (TBO)

A ticket box office is required outside the venue secure perimeter, next to the spectator entry point for ticket sales, will-call, or ticket related services. This is a cabin structure with ticket portals, approximately 90m² or multiple 30m² offices at different spectator entry points to the venue.

iii. Pedestrian Security Screening (PSA)

Entry into a venue, whether by spectators or accredited persons, happens through a PSA. The Pedestrian security screening (PSA)s process occurs in tent portals where each individual is scanned and checked prior to entry into the venue. The area and number of PSA's will be determined in the crowd modeling exercise, which will determine the spectator through put rates into the venue, establishing the number of PSA's required. One dedicated lane for accredited persons to be provided at the Spectator/FOH PSA's.

iv. Ticket Scan

Ticket scan will occur just after security screening operations at the venue perimeter, prior to access into the spectator plaza, as an extension to the entry process. The area and number of ticket scan portals will be determined once the PSA through put rates have been

established.

v. Spectator Plaza

The spectator plaza occurs between the PSA's and the venue, with direct access to the spectator concourses, where spectator amenities and services are provided, as well as access to seating and competition areas. The size of the spectator plaza will be determined through the crowd modeling exercise and spectator load-in/egress rates. Based on the existing conditions of the venue, the spectator plaza, concourses, and amenities may be provided with temporary infrastructure including toilets, concessions, retail outlets, spectator medical, ticket resolution, and information, prior to entry into the seating bowl and competition areas.

vi. Spectator Services – Plaza

Spectator services storage and staging areas are required for golf carts, wheel chairs, and stroller storage – this area should be no larger than 25m². In addition, an animal relief area, with direct access to potable water and drainage, is required. This area should be no larger than 10m².

vii. Exit or Blow Out Gates

Exit gates or blow out gates are located adjacent to the entry ticket scan portals. The number of gates is determined based on the venue capacity and crowd modeling, to accept the exiting spectators from the Stadium into the transportation points and sports complex general population and circulation.

b. FOH Internal Program Requirements

i. Spectator Services – Information and Storage

An area, existing or temporary, to be provided for spectator information, lost and found, and additional wheel chair and stroller storage. This space should be located centrally in the main spectator concourse area, and should be approximately 50m² (multiple locations may be provided each 25m²) in area with provisions for a counter to provide separation between event services staff and spectators. Use of the existing venues information office is preferred.

ii. Ticket Resolution

Multiple ticket resolution offices or areas, existing or temporary, to be provided centrally in the main spectator concourse area. A minimum of (4) offices to be provided with an area approximately 10m² each, with provisions for a counter to provide separation between ticketing staff and spectators. Use of the existing venues TBO is preferred, if located within the venue perimeter, as one location.

iii. Concessions

Use of the existing concession areas to be provided, and depending on the number of existing concession areas, additional temporary areas for concession sales may be required. A thorough review of the existing concessions conditions, operations, and services to be completed to determine if upgrades are required to ensure code compliance along with spectator accessibility best practice and compliance.

iv. Retail Outlets

Use of the existing retail store outlet to be provided, and depending on the size, additional temporary retail outlets may be required throughout the spectator areas. A minimum of (4) retail outlets to be provided in addition to the main store with approximately 6m of counter space.

v. Spectator Toilets

Use of all existing spectator toilets to be provided, and additional temporary toilets may be required to accommodate the venue use. A thorough review of the existing toilets to be completed to determine if upgrades are required to ensure all toilets provide the required accessibility provisions to meet best practice and code compliance per the venue capacity.

vi. Spectator Medical

Use of the existing spectator medical area to be provided. If the existing spectator medical does not exist, a space of approximately (2) 50m² stations are required. The space needs to have water and drainage, along with direct access to an accessible toilet.

vii. Water Stations

Water areas to be provided in the venue through existing drinking fountains or water fill stations. Water to be tested for drinking water use. Number of stations to be compliant with venue capacity and located throughout the spectator concourse areas.

c. Other Major FOH Program Requirements

i. Seating

The venues existing spectator seating gross capacity will net 15-20% less to accommodate for accredited seating and seat kills due to ceremonies build out, camera platforms, broadcast and press tribunes, and photo positions. Spectator services requirements and compliance to be aligned with this net capacity number.

3 | Back of House (BOH) Program Requirements

Back of House (BOH) areas are where ceremonies and all venue operational spaces are located. Several spaces are required to be internal to the venue, with others in compounds outside the venue, with access to the venue for servicing and operations.

BOH operational areas include ceremonies operations and compounds, performers and talent areas and staging, ceremonies and performer medical, Heads of State, Dignitaries, and Olympic Family areas, technology, food and beverage compound, cleaning and waste compound, workforce check-in and break areas, logistics compound, site compound, security, venue operations and management, broadcast compound, and venue accreditation. In addition, there are services compounds, parking, venue access points, and emergency services vehicle staging required in the BOH.

General considerations for the external BOH compound spaces include paved surfaces for high traffic use – vehicle and pedestrian, along with structures – tents, cabins, containers, and equipment. Connections to water and waste, along with fibre is a plus to minimize additional works that would be required for necessary service connections. Overall drainage of the BOH compounds is critical for proper surface water drainage. Considerations for internal BOH spaces include direct connections to the external BOH spaces for cabling and venue servicing.

a. BOH Internal Program Requirements

i. Ceremony Operations

Ceremonies operations requires site compounds, staging, storage, workshop and fabrication shop, control rooms, offices, conference rooms, work spaces, food services and dining, and technical rooms. These areas will be located inside the stadium and in external compounds with easy access to the tunnels and field. An area approximately 5000m² is required.

ii. Performers and Talent Areas

Check-in, holding, prep, dressing, costume management and repair, and staging for performers and Athlete's, along with green rooms for talent, with direct or easy access to the field level or entry tunnels to be provided. These spaces can be in compounds or in the venue itself, with a space approximately 10,000m².

iii. Ceremonies and Performer Medical

Ceremonies and performer medical to be located with direct access to the field level, requiring a space allocation of approximately 300m², with connections to water and waste.

iv. Heads of State and Foreign Dignitaries

Heads of State and foreign dignitaries will be in attendance to both the Olympic and Paralympic Opening and Closing Ceremonies. Entry to the venue will be determined through a security exercise that will require dedicated entry, safe rooms, and Five Rings VVIP lounge. Entry and safe room area is approximately 1000m² and the Five Rings VVIP lounge approximately 500m².

v. Olympic Family

The Olympic Family (OF) lounge and protocol offices to be located in existing lounge or club spaces or areas directly adjacent to the Olympic Family seating areas, with dedicated toilets. This space needs to be a minimum 1000m².

vi. President's Box

The President's box is the seating and podium area for the President of the International Olympic Committee and the President of the International Paralympic Committee to officially

open and close the Olympic and Paralympic Games. In addition, there is seating for Heads of State and foreign dignitaries.

The President's box, requires direct access from the VVIP and Olympic Family lounges, with custom seating and layout, with an area approximately 200-250m².

vii. Technology Operations

Dependent on readily available connections to fibre, there may be a requirement for compound spaces for technology and cellular structures, staging, along with containers for equipment and storage. This storage can be in the form of a tent or several containers. The compound space required is roughly 200m². Operational spaces, work areas, and offices to be located on arena level with direct access to the tribunes and ceremonies control rooms, this area is approximately 300m².

b. BOH External Program Requirements

i. Food and Beverage (FAB) Compound

The food and beverage compound is the space for storage of both food and beverages, along with kitchen and food prep areas. Dependent on the venue, a temporary kitchen and additional storage is necessary to service all the additional lounges and food services outside concessions and standard venue operations. FAB sponsors, i.e. Coke, will also provide their own containers for storage on site and require a minimum of 1.5 days storage of products. This compound also requires offices, workforce areas, toilets, connections to water, waste, power, and easy truck access for daily off-hours food delivery. The compound space required is approximately 1000 – 1500m², depending on existing venue kitchen facilities.

ii. Cleaning and Waste (CNW) Compound

The cleaning and waste compound is an area for the staging of the large mobile collection bins, bin wash down area, compactors for the required waste streams, storage of CAW cleaning and paper products, along with offices. The compound space required is approximately 800m² with an additional area of 1000-2000m² for snow removal equipment and snow storage.

iii. Workforce (WKF) Check-In and Break

An area to be provided for workforce check-in and break areas adjacent to the venue and workforce accredited entry to the venue. These spaces can be in a tent structure, with workforce check-in space allocation at approximately 400m² and workforce break at approximately 1500m².

iv. Logistics (LOG) Compound

The logistics compound requires space for an office cabin, toilets, staging, and storage space. Additionally, this compound will provide containers for storage for other functional teams, dependent on in-venue storage, as well as parking for large equipment and vehicles. This compound is approximately 1000m², and must be secured due to the equipment and goods stored.

v. Site (VED) Management Compound

The site compound requires space for offices, toilets, staging, and storage areas for Site Management along with Energy, Look of the Games, and Signage and Wayfinding. Additionally, this compound requires parking for large equipment, vehicles, and spares with an overall compound space requirement of approximately 1000m², and must be secured due to the equipment and goods stored.

vi. Security (SEC) Operations

As a venue within the sport complex, a full secure perimeter is required with control points and accredited PSA entry/exit access points. Accreditation access points are located BOH, with exception to one FOH accredited entry. Accredited entry points are provided for Staff, Dignitaries, Olympic Family, Athlete's, and Media.

In addition, security operations require offices, control centre, briefing, and storage spaces – these can be in the venue or in an external compound tent or cabin structure, with a compound size of approximately 400m². Dedicated power and direct fibre connections are required to support their secure independent servers and operations.

In addition to the security compound, there will be required space for Dignitary and Heads of State stage, entry, and safe room. This area will be developed as part of the security planning and protocols, an area of approximately 1000m² should be allocated for these

operations.

vii. Venue Management Operations

If space is not available in the venue, a venue operations centre (VOC) is required. This space will house the offices for venue management and miscellaneous functional areas, event services offices and storage, venue briefing area, venue communications centre, and storage as required. If located externally, these spaces can be in a tent or cabin structure, and is approximately 400m².

viii. Broadcast Compound

The Ceremonies broadcast compound for the Olympic Broadcast Service (OBS) at the Winter Games, requires approximately 6000m² of clear open space immediately adjacent to the venue. The compound provides Rights Holder Broadcast (RHB) spaces and OBS technical operations, offices, and connections to the International Broadcast Centre (IBC) and in venue operations.

The compound will also require its own dedicated generator compound, dedicated to OBS operations in the compound and at the venue. This space is roughly an additional 500m² of required space, directly adjacent to the BRD compound.

In venue operations include camera positions and platforms, commentator positions, mixed zone, broadcast studio, commentator control room (CCR), and Broadcast Information Office (BIO). The studio space is approximately 30m², the CCR space is approximately 50m², with the BIO approximately 25m².

ix. Press Operations

As the ceremonies venue is not combined with a competition venue, there is no requirement for a Venue Media Center (VMC) at venue. Press will be located in the press tribunes located in the seating bowl, with an additional space required for photo filing and press offices of approximately 300m² directly adjacent to the tribune area. Access is required from photo positions to the tribunes and tribunes to the media PSA and load zones located BOH.

x. Transport

A transport office, storage, and drivers lounge is required outside the venue secure perimeter to manage vehicle access, traffic, and venue load zones. This area is next to the VSA and parking areas. These structures can be tents or cabins and require space approximately 100m² for the Driver's lounge and 100m² for offices and storage.

xi. Venue Accreditation

A venue accreditation office is required outside the venue secure perimeter, next to the Olympic Family and Media entry points. This is a cabin structure approximately 30m².

c. Other Major BOH Program Requirements

i. Services and Access

Access to water and waste, along with access to fibre connections is required for BOH compound spaces. In addition, there will be Ceremonies and BOH energy requirement for prime generated power, along with redundancy generated power requirements. Energy compounds are broken into specific areas adjacent to the compounds and the venue with the most direct routes to reduce cable lengths. Roughly 8 compounds should be considered, outside the broadcast (BRD) compound, of approximately 500m² each.

ii. Parking and Vehicular Access

Each BOH compound will require parking within its compound for various operations. Additionally, Dignitaries, Olympic Family, OBS and operational staff require parking – this can be as high as 200 parking stalls, with an area of approximately 5000m², to allow for parking and bus systems of accredited groups.

Further transportation planning with new and existing public and games transportation systems can reduce this number, but should not be less than 100 stalls for this venue.

BOH venue vehicle access is through a security vehicle screening area (VSA). A loop in and out of a venue is preferred, allowing for easy access of large trucks without backing up at any point of its entry into a venue. There is only one point of entry and exit for vehicles at a venue.

iii. Ambulance Staging

Emergency services vehicles will also require space within the venue BOH, dependent on the safety plans – fire trucks would be centrally located within the park, however, two ambulances would be required for the venue – one dedicated to Athlete's and the other for Spectators. These ambulances are located adjacent to the building, with direct access to both the field and spectator areas, and require connections to power.

d. Ceremonies Stage (FOP) Space Requirements

The Ceremonies stage (the field) is the area where Ceremonies takes place, whether on the field, the roof, or in areas of the seating bowl. In addition, to the field area, there are several areas that are directly adjacent to the field which are also considered as part of the stage. These areas include tunnels, off field staging, ceremonies control booths (located through out the venue), roof systems and platforms, lighting positions, audio positions, and video boards, broadcast camera platforms and positions, photographer risers and positions, and the President's Box.

Development of the Ceremonies show will require potential modifications to the field, areas of the seating bowl, and areas around the field. Any modifications would be part of the Ceremonies team scope of works and coordinated into the temporary build of the venue for Games. Additional lighting, audio, video and aerial systems to be added to the venue as part of the temporary build.

Access to the field through existing tunnels will be required and dedicated to the ceremonies production as well as the compounds located nearest the venue that allow for the best flow onto the field or stage areas.

VENUE TRANSPORT SUMMARY

Refer to Appendix 4AA

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VENUE PROFILE SUMMARY

Venue: McMahon Stadium

Location: U of C/Foothills Athletic Park

Key Contact: James McLaughlin

Owner/operator: City of Calgary/U of C

Current use: Stampeders, Dinos

	Yes/No	Comments:
FOP standards/IF approval:	Yes	Used for 88 games
Operational space	yes	Concessions, washrooms – need to be upgraded
External space – FOH	Yes	
External space – BOH	yes	
Parking	no	Little after laydown
Utilities services (gas/water):	yes	Existing. May need upgrade
Mechanical/electrical:	yes	May need upgrade
Technology/BMS:	N/A	Mostly outside
Fiber connectivity:	Yes	Will need redundant cable
Access & Egress Transit:	yes	LRT near site
Access & Egress Pedestrian:	Yes	existing
Long term use contracts:	yes	Calgary Stampeders, U of C Dinos
Capital improvement plan:	Yes	Phase 3 plan, RFP issues with 3 proposals for consideration
Adjacent land (plans in use):		Possible field house Possible Crowchild redevelopment
Lighting levels for broadcast use:	no	Needs supplemental or replaced
Sponsorship rights and agreements:	yes	Coke, Molsons, Food

VENUE GAPS, CHALLENGES, AND CAPITAL WORKS PROJECTS

The McMahon Stadium, is an ideal location for consideration for the Olympic Games, with operations and use of the facility fitting the program requirements for Opening and Closing Ceremonies. The venue is able to convert to Ceremonies, ensuring as a baseline, that this venue can be developed, using existing and temporary infrastructure to build out the venue to meet current Olympic Games requirements for ceremonies, space, and operations.

The Olympic Games brings a different number of users and accredited groups, protocols, security, and overall operations that are not seen in daily operations at McMahon or past Olympic Games. With this in mind, along with the age of the facility, there are several areas to be reviewed and considered for upgrades.

The following gaps, challenges, and capital works projects are discussed to give a complete view to the feasibility and potential requirements for additional works at this venue.

4 | Venue Challenges

a. Topography to Compounds

The compound spaces will require increased containment systems to connect services to the venue.

b. Spectator Concourse

Crowd modeling study to be conducted to confirm the spectator concourses space for load in of spectator seating, potential for adjusting of compound spaces may be required.

5 | Capital Works Projects

As an existing venue, specific areas need to be reviewed to determine if upgrades will be necessary to meet Games requirements. The following items have been reviewed by Dialog Design, to confirm current conditions and provide recommendations for upgrades to meet Olympic requirements.

a. Spectator Areas and Amenities

- i. Seating**
- ii. Toilet Facilities Capacity**
- iii. Toilet Facilities Conditions including Code Compliance, Family, and Accessible Requirements**
- iv. Concessions Capacity and Conditions**
- v. Accessible and Amenity Seating Conditions**

b. BOH Support Spaces

- i. Operational Spaces**
- ii. Lighting**

Current Lighting Conditions and Capacities

iii. Mechanical Systems

Current Conditions and Capacities of the Mechanical System

APPENDIX A: BROADCAST LIGHTING TECHNICAL SPECIFICATIONS

BROADCAST LIGHTING TECHNICAL SPECIFICATIONS



Esteem Projects & Consultancy

Date: 8th February 2017

Re: Olympic Broadcasting Service (OBS) summary of current Broadcast Lighting Technical Specifications.

Following is a summary of the OBS technical specification for broadcast lighting. The IOC and OBS would provide a comprehensive specification on confirmation of the Olympics Host City.

Below sets out the key areas for consideration when planning and design for games time lighting.

In addition to the completion area that require quality lighting are the non field of play areas such as

- Mix zones
- Press conference rooms
- Announcer positions
- Athlete holding areas
- Athlete pathways to FOP
- Spectator areas
- Warm up areas and Fields of play
- Medal and Flower Ceremony's
- Flags of Nations and Ceremony Flags

The technical specifications provide the detailed requirement for all venues. Sport specific requirements can vary between sports and venues. Consideration should be given to these specific requirements when formulating designs and equipment.

OBS Technical Specifications Summary **Version February 2017**

Light source (lamp)

The specified requirements apply to all light source (lamp) technologies e.g. HID (MHN, HQI, HSI, HIT, MSR, MSD etc.), LED, fluorescent etc.

Flicker

To support HFR production requirements and irrespective of the lamp technology e.g. HID, LED etc., the lighting shall be flicker free; the lamp driver/control gear shall be of the electronic type with an output frequency $\geq 1,000\text{Hz}$.

Low wattage lamps are preferred. The lamps shall be from the same manufacturer and from the same production batch.

Colour temperature:

The colour temperature, Tk, shall be 5600K (standard TV camera preset).

All lamps shall have the same colour temperature. That is, the colour temperature shall be nominally one value e.g. 5600K. Differences in colour temperature between different wattage lamps (at the FOP in question) are not acceptable.

It follows that if the competition of a sport is held at two (or more) venues, the FOP broadcast lighting of each shall have the same colour temperature.

Colour rendering10:

The CIE CRI Ra shall be ≥ 85 ;

and if no proven international standard installations of the lamp/luminaire system exist, a live field test with the intended light source/luminaire and a broadcast quality camera in cooperation with a national sports broadcaster shall be conducted and the results made available for review;

or

- Alternatively, TLCI11 Qa ≥ 85 ; or
- Alternatively, CRI Ra ≥ 85 and a R9 ≥ 45 ; or
- Alternatively, CRI Re(R1-R15) ≥ 85 .

If, for practical reasons (legacy, economics etc.), the lighting over the spectators has different lamp technology luminaires to the FOP, the colour temperature of these (spectators) luminaires shall not be higher than the FOP lamps.

Lighting equipment and operating conditions

The lighting equipment shall be suitable for the operating environmental conditions of the venue in question; and ensure that the lamps operate at the correct colour temperature and light output characteristics. The lighting equipment shall comply with the relevant host country's electrical safety standards. Luminaires shall comply with IEC 60598. The lamps shall comply with the relevant IEC lamp standards.

Winter Games outdoor venues, cold weather and lamp performance.

Extreme cold weather affects the proper functioning of all lamps (HID, HMI, fluorescent, LED). Apart from a lower light output, in particular the colour temperature may change significantly even between individual lamps and become unacceptable.

Lamps shall be operated on control equipment designed for very low temperatures so that the lamp operates to the stated nominal performance characteristics and meets the above requirements; and be utilised in luminaires designed for cold temperatures.

Anticipated light output losses due to low temperatures shall be factored into the lighting design.

The projected Games time temperatures shall be established well in advance.

Secondary warming (heating) the localised ambient temperature and air space control to ensure compliance should be considered. If necessary tests should be carried out to ensure the equipment would operate at the Games time predicted operating temperatures.

Calculation and measurement grids

Calculation grid intervals shall nominally be 2m (varies per sport – see specific sport requirements).

Illuminance towards a camera - known as camera illuminance, E_c , shall be on a plane nominally at 1.5m above the FOP surface.

Vertical illuminance, E_v , towards a nominated side of the FOP shall be on a plane nominally at 1.5m above the FOP surface.

Horizontal illuminance, E_h , shall be calculated/measured on the FOP surface.

Compliance illuminance measurement grid intervals shall nominally be 4m.

Note: the calculation plane shall match the gradient/slope of the FOP; e.g. cycling track, alpine skiing slalom; and/or the athlete's principal competition 'line' through the space above the FOP which may be a vertical plane e.g. skiing freestyle aerials, diving and ski jumping.

Camera locations

The camera positions modelled in a lighting design shall be as specified by OBS. Nominal camera plans are provided as production teams can survey the venues and formulate related plans.

HD, 4k and HDR

The on-going evolution from standard definition to high definition and beyond raises the question of

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illuminance levels. The reality is that with most professional broadcast camera system cameras, the sensitivity remains the same. In other words, the illuminance criteria herein remain the same for HD and 4K.

Similarly, high dynamic range (HDR) provides no additional restriction. At the time of publication 8K is in the early stages but it likely that the same requirement will prevail. The reader should check with OBS for currency.

Minimum illuminance

The minimum vertical illuminance at any point of the FOP shall be $E_c \geq 1,600$ lux towards the main cameras.

Note: the minimum average illuminance and the average horizontal illuminance are determined by the uniformity ratios. For HDTV/4K it is imperative the uniformities are met or exceeded.

The minimum vertical illuminance at any point of the FOP towards the orthogonal directions of the FOP, where camera #1 is central to a side, or 45° to the 4 sides of the FOP where camera #1 is not central to a side shall not be less than 70% of the minimum illuminance towards any main camera.

Uniformities for FOP

Vertical illuminance uniformity for each relevant main camera.

The minimum to maximum camera illuminance ratio, $E_{c\ min}/E_{c\ max}$, shall be ≥ 0.7 for the FOP; and ≥ 0.4 for the FOP-surround.

The minimum to average ratio, $E_{c\ min}/E_{c\ ave}$, shall be ≥ 0.8 for the FOP; and ≥ 0.6 for the FOP-surround.

Horizontal illuminance uniformity

The minimum to maximum ratio $E_{h\ min}/E_{h\ max}$, shall be ≥ 0.7 for the FOP; and ≥ 0.4 for the FOP-surround and/or run-off

The minimum to average ratio, $E_{h\ min}/E_{h\ ave}$, shall be ≥ 0.8 for the FOP; and ≥ 0.6 for the FOP-surround and/or run-off

The ratio of vertical illuminances at any point on the FOP between the orthogonal planes (at either 90° or 45°; i.e. four calculation planes only) facing the four sides of the FOP shall be ≥ 0.75 and ≤ 0.9 .

The average vertical illuminance on the FOP towards camera #1, or the designated principal camera, shall be greater than the average vertical illuminance towards the other 3 orthogonal directions.

The uniformity gradient UG , for both horizontal (UG_h) and vertical illuminance to main cameras (UG_c) shall nominally be $\leq 10\%$ on a 2m calculation grid (varies per sport by interpolating the appropriate calculation grid).

The UG_v of the vertical illuminance towards the backlight side or sides where there are no fixed cameras shall nominally be $\leq 20\%$ at 4m grid intervals (varies per sport and interpolation).

The ratio of the average horizontal illuminance of the FOP surround to the average horizontal illuminance of the FOP shall be ≥ 0.6 and ≤ 0.8 , target 0.7.

Slow motion replay zone (SRZ): some sports will have a defined SRZ. In the absence of a specific SRZ requirement, the $E_{c\ max}$ towards the main camera, shall be at the FOP centre.

Coefficient of variation (CV): the CV shall be ≤ 0.13 .

Maximum illuminance

Whilst firstly complying with the six basic specified uniformity criteria i.e. $E_{c\ min}/E_{c\ max}$, $E_{c\ min}/E_{c\ ave}$, $E_{h\ min}/E_{h\ max}$, $E_{h\ min}/E_{h\ ave}$, UG_c and UG_h , the maximum illuminance towards the main cameras, $E_{c\ max}$, $\geq 2,000$ lux.

Luminaires and aiming logic

The luminaire-aiming angle shall be $\leq 65^\circ$. Light should reach any point within the total FOP from at least three directions where the third directional component should form a 'backlight' to one or both of the other two directions, with respect to the main cameras.

No luminaire shall be aimed directly at a camera, and not within a 50° cone centred on the camera lens. If the aiming point potentially coincides with a (hard/main) camera, the azimuth aiming angle shall be outside a cone of 50°.

A luminaire within the field-of-view (FOV) of the main cameras and aimed generally in a direction towards the cameras shall be constructed, or fitted with a glare-controlling device. The control shall be such that the light emitting area of the lamp is shielded from the camera's FOV or fitted with barn-doors, louvres or similarly acceptable devices.

Fit-for-purpose louvres, shields, hoods, barn-doors etc. may also be required to minimise the effects of glare, spill light and reflected (skip) light.

Equipment type and position shall be chosen to meet the specified glare limits.

Where the sport includes athlete action above the FOP surface (e.g. gymnastics, ski-jumping, diving etc.), there shall be light projected through the space above the FOP. The athlete's performance space in effect becomes the 'field of play' with respect to broadcast.

The total amount of light (luminous flux) projected from the camera #1 side shall not be less than the total luminous flux from the opposite side. Lighting equipment (luminaires, truss, cable looms, and chain motors etc.) located between the main cameras and the far side of the FOP shall be outside the cameras' field of view (FOV) when shooting the competition.

Noise – lamp control gear or drivers shall be silent (no ballast "hum"). Apart from aerial sports, in principle the luminaires should be designed, installed and aimed such that there is no light projected above the horizontal.

Multiple venues for one sport

Some sports take place at two or more venues accommodating preliminary rounds and the finals. The BRD LX quality of the two (or more) venues shall be the same, or as close as possible – a difference of not more than 5% of both the average horizontal and the average vertical illuminance (to camera 1). The colour temperature shall be the same or not more than a 5% differential.

The baseline lighting quality shall be set by the venue that stages the finals.

End of Technical Specifications

Report Author:

Steven Allen

Esteem Projects & Consultancy LTD. London UK

Broadcast Lighting Consultants to PyeongChang 2018 & Tokyo 2020

Previous Olympics: - Rio 2016, Sochi 2014, London 2012, Vancouver 2010

End of Report

[REDACTED]

[REDACTED]

DRAFT

APPENDIX C: SCOPE OF WORK

McMahon Stadium is being proposed as a potential location for opening and closing ceremonies for the Olympics. The goal of this exercise is to explore the feasibility of McMahon acting as the venue for the opening and closing ceremonies. The main focus being on determining if the area is large enough to have a CFL field as the central area with spectator seating around.

As an alternate - the site may alternately be used as an event location for big air. This would be a nightly event.

Deliverables:

- 11x17 document that outlines all findings, sketches, text and supporting documents.
- Text document describing the anticipated capital improvements (including square footages). Also include text on the building engineering including roof load capacity, mechanical HVAC description, plumbing and electrical capacities.
- Text document outlining temporary works that will need to be completed on the site (that would be considered capital costs) as well as remediation measures that will need to be undertaken post games.
- Simple sketches showing
- Proposed plan/seating arrangement with stage and temporary seats
- Proposed plan/seating arrangement without temporary - legacy condition.
- Sections in two directions showing the seating and stage
- Plan showing additional permanent seating with big air.
- Deliverables as required to complete a Level 5 costing exercise.

Format of Deliverables:

- The CBEC team will ensure that credit is given to all work completed by architectural and engineering professionals; however, information needs to be provided to CBEC in a 'raw' form as it will be included within an overall report that will require a consistent look.
- Text documents should be provided in WORD.
- Drawings - provide pdf drawings, as well as AutoCAD plans. AutoCAD plans are

required by CBEC to complete an overlay analysis. Also provide your logo for inclusion in the CBEC title block for the overlay drawings.

Summary of the key requirements and areas to be assessed:

- As the centre stage area aim for a CFL field with a 3 meter perimeter around. Spectator Area:
 - Overall 40-53,000 seats.
 - Currently McMahon Stadium has a capacity of approximately 34,000 seats. The remainder of the seats would be temporary.
- Accessibility - accessible and amenity seating in multiple locations to serve 1% + 1% of the seating (1% accessible, 1% amenity).
- Spectator Amenities: Assess the current washroom amenities and determine the required capital improvement required to add/improve existing washrooms. Temporary washrooms will be allowed for to serve the additional 7-20,000 temporary seats.
- Concessions will be approached in a similar manner as washrooms. Identify the anticipated linear footage of concession counter, and square footage of area that would be required for the permanent legacy piece.
- Provide a list of lounge spaces that will be available for groups, dignitaries, etc. Complete with square footages.

Back of House Requirements:

- Provide a list of back of house spaces that are currently available that could be used as change rooms, green rooms, staging areas, etc. complete with square footages.
- List of operations spaces including workshops, staging, storage, control rooms, etc.

Roof:

- N/A

Electrical, Lighting & A/V:

- Lighting levels to meet Olympic Games Broadcast requirements of 2000 lux with zero flicker tolerances. What would the anticipated permanent build lighting be? How much will we need to supplement?

- Identify if there is a readily available connection to fibre.
- Energy requirements will include prime generated power along with redundancy generated power requirements.
- Allow for a design load of 10 MW with a demand of 6 MW.

Mechanical/Civil:

- Will the existing services (water and sanitary) be able to handle the increased loads?
- Storm water management.

Temporary Works:

- Any other works that may need to be completed that would alter the existing conditions that would need to be put back (such as removing goal posts, etc) should be identified and outlined now.

FULL VENUE REPORT:

McMahon Stadium

Architectural (Lead): DIALOG

Structural: Entuitive

Mechanical: MCW Engineering

Electrical: Designcore Consulting Electrical Engineers

Drawings: DIALOG

Cost Consultants: Altus

MCMAHON STADIUM

CBEC Opening and Closing Ceremonies Venue

1 Introduction

The intent of this document is to summarize the study and design options with their preliminary associated costs (Class 5 cost estimate) completed by DIALOG. The scope includes exploring different permanent and temporary seating configurations to meet both 40,000 and 55,000 seats at the McMahon Stadium site for 2026 Winter Olympic Games. Package indicating seating arrangement options is attached to this report.

The report includes

- Seating layout options with existing arrangement hosting Big Air event.
- Recommendations for upgrades and renovations to the existing facility to ensure the long-term future of the facilities after the Games.
- Estimated area of existing spaces could be used for Back-of-house/ operations/ lounge spaces. Full facility assessment is required to confirm the availability.
- Estimated number of seats for Big Air competition.
- Partial building code review looking specifically at washroom and accessibility requirements.
- New universal, barrier-free access washrooms are also recommended to meet the current best practice standards for accessibility. The study does not constitute a full Building Code compliance review.
- Look at the feasibility of locating a bus staging area on the current practice field located in the south of the McMahon Stadium site.

2 Description of Seating Lay-out Options

Option 1 – 40,400 seats

Option 1 completes no renovations or upgrades to McMahon stadium. To reach 40,000 spectators, 5000 temporary seats are added to the north end of the stadium.

As required by CBEC all proposed seating to be located around a CFL field-sized raised center stage. Due to the raised stage, the first 5 rows of the existing grandstand are below the stage. This seating can be replaced with on-stage seating.

If McMahon Stadium is used for the Big Air competition, the jump will be installed in the middle of the infield. This will allow good sightlines from roughly half of the west and east grandstands, as well as any temporary seating placed on the north. Approx. 17700 spectators plus temporary.

There is no legacy component with Option 1.

Washrooms

With 40,000 spectators, temporary washrooms are required to meet Building Code minimum requirements. 60 total temporary water closets are required. (Male; 12 urinals, 6 W/C, 2 HC. Female; 36 W/C, 4 HC)

To meet a recommended water closet count, based on stadiums of similar size, 354 temporary water closets are required (Male; 78 urinals, 28 W/C, 34 HC. Female; 149 W/C, 32 HC. 33 universal W/C)

Summary of Option 1

- **40,400** total seats.
- The **35,400** existing seats remain after the games.
- No renovations or upgrades to McMahon Stadium

Option 2 - 55,400 seats

Option 2 completes no renovations or upgrades to McMahon stadium other than temporary site work. To reach 55,000 spectators 10,000 temporary seats are added to the north end of the stadium and 10,000 temporary seats are added to the south end of the stadium.

As required by CBEC all proposed seating to be located around a CFL field-sized raised center stage. Due to the raised stage, the first 5 rows of the existing grandstand are below the stage. This seating can be replaced with on-stage seating.

There is no legacy component with Option 2.

Washrooms

With 55,000 spectators, temporary washrooms are required to meet Building Code minimum requirements. 185 total temporary water closets are required. (Male; 37 urinals, 19 W/C, 6 HC. Female; 111 W/C, 12 HC)

To meet a recommended water closet count, based on stadiums of similar size, 576 temporary water closets are required (Male; 143 urinals, 50 W/C, 48 HC. Female; 243 W/C, 46 HC. 46 universal W/C)

Summary of Option 2

- **55,400** total seats
- The **35,400** existing seats remain after the games.
- No renovations or upgrades to McMahon Stadium

Legacy Component

Both Option 3 and 4 include a renovation to McMahon Stadium prior to the Olympic games to upgrade and enhance the overall experience of McMahon Stadium. The main focus of these renovations is to expand the concourse level to allow for additional washrooms and concessions to meet the crowd capacity, while opening up the concourse to the field of play.

Summary

- New entry plaza
- New ticketing windows
- New fan zones @ north endzone
- New retail store
- New concourse level, open to field of play
- New washrooms and renovated washrooms
- New accessible and companion seating
- New stadium seats for the lower bowl
- New food prep kitchen
- Permanent seating reduced to 28,700 seats

Description

Beginning at the north end of the stadium we propose a new entry plaza. The North Plaza is a community gathering space that can be used as a pre-event space or in general as a wider community resource. It includes enhanced ticketing and retail store that is accessible from both the exterior and interior of the stadium. The entry will have direct access from a new tailgating zone and bbq area. From the new entry plaza fans will proceed either to the West or the East grandstands. It is important to note that the new entry will also serve as a new end zone concourse level that creates a connection from east to west.

Working on the existing grandstands we will create a new concourse level and open the concourse with views to the field of play. This new concourse will be approximately 10 feet above the current concourse. This removes approximately 8 rows of seating, a loss of approximately, while filling in the old voms with seats (2000 seats removed). The old concourse will become a new prep kitchen offering food prepared on site for the first time. This will greatly enhance the quality of food service.

The new enhanced concourse will provide a level of fan experience never before possible in McMahon Stadium by creating a zone where fans can be on the concourse and also still visually connected to the game. This concourse will also allow for all new concessions and washrooms that will be representative of the standard of service at competing CFL stadiums.

As part of this renovation to the stadium we would also add new club zones at the north end of the grandstands adjacent to the end zone. These patios would be near the end zone and would create enhanced fan zones and a new level of game experience. As part of the new patios we would remove sections L and M of the grandstand. This would reduce the total seating capacity by (2470 seats). These are not great game seats and in our opinion the patios would provide a better game time experience.

The exterior perimeter walls of the stadium would be enhanced and expanded. These walls would create larger concourses and provide the fans area to hang out during the game.

New 20" and 21" seats would be added to the lower seating bowl

Please see additional package for more information.

Option 3 - 40,700 seats / (28,700 legacy seats)

With the renovations and upgrades completed prior to the Olympics, the permanent seat count will be 28,700. To reach 40,000 spectators, 12,000 temporary seats will be added to the north endzone.

As required by CBEC all proposed seating to be located around a CFL field-sized raised center stage. Due to the raised stage, the first 5 rows of the existing grandstand are below the stage. This seating can be replaced with on-stage seating.

Washrooms

With the renovations and upgrades completed to McMahon stadium prior to the games, no temporary washrooms are required to meet Building Code minimum requirements with 40,000 spectators.

To meet a recommended water closet count, based on stadiums of similar size, 177 temporary water closets are required (Male; 52 urinals, 18 W/C, 11 HC. Female; 75 W/C, 11 HC. 10 universal W/C)

Summary of Option 3

- **40,700** total seats.
- **28,700** legacy seats.
- New entry plaza
- New ticketing windows
- New fan zones @ north endzone
- New retail store
- New concourse level, open to field of play
- New washrooms and renovated washrooms
- New accessible and companion seating
- New stadium seats for the lower bowl
- New food prep kitchen

Option 4 - 55,700 seats / (28,700 legacy seats)

With the renovations and upgrades completed prior to the Olympics, the permanent seat count will be 28,700. To reach 55,000 spectators, 12,000 temporary seats will be added to the north, and 15,000 temporary seats will be added to the south endzone.

Summary of Option 4

- **40,700** total seats.
- **28,700** legacy seats
- New entry plaza
- New ticketing windows
- New fan zones @ north endzone
- New retail store
- New concourse level, open to field of play
- New washrooms and renovated washrooms
- New accessible and companion seating

- New stadium seats for the lower bowl
- New food prep kitchen

3 Back-of-house Requirements

We estimate a total of 3,647 sq.m. current space that could serve as Back-of-house spaces. Areas as follows.

• East Concourse	248.4 sq.m
• Stampede Admin	447.3 sq.m
• Coaches Building – Main Floor	307.6 sq.m
• Coaches Building – Second Floor	484.5 sq.m
• Amateur Support Bldg – Ground Floor	1362.6 sq.m
• Admin/Player Building	796.9 sq.m

4 Operations Requirements

We estimate a total of 928 sq.m. current space that could serve as Operations spaces. Areas as follows.

• East Concourse	256.4 sq.m
• Press Box – Top West Stands	238.5 sq.m
• Amateur Support Bldg – Ground Floor	80.5 sq.m
• Admin/Player Building	193.8 sq.m
• West Concourse	158.7 sq.m

5 Lounge Spaces

We estimate a total of 2091 sq.m. current space that could serve as Lounge spaces. Areas as follows.

• Red and White Club	1422.3 sq.m
• VIP Super Suite	468.5 sq.m
• Sky Boxes – Top West Stands	200 sq.m

6 Temporary works

Existing structure on the field will be removed to allow for stage installation, this includes player benches, uprights, and other fixtures on the field of play. The current scoreboard, located in the south endzone area will need to be relocated in the options that install the Big Air or temporary seats in that area. These fixtures will need to be relocated to their original positions after the games.

7 Bus Staging Area

At the south end of the McMahon Stadium site there is currently a grass practice field with the rough dimensions of 100.5m by 59.7m. This surface can be accessed through the south parking lot and a current ramp at 8% grade which is 3300mm wide. To allow for buses to pass each other on this ramp, it would need to be widened to approx.. 6000mm. A staging area of this size would allow space for roughly 40 buses

Please see Bus Staging plan included in additional package for more information.

END OF REPORT

ENTUITIVE

CBEC Opening and Closing Ceremonies Venue McMahon Stadium

Project Description

The McMahon Stadium has been identified as a main venue for the 2026 Winter Games and may host the opening ceremonies and Big Air. The legacy use of the facility may include an enhanced stadium.

The existing facility includes two opposing precast grandstands, the Red and White Club structure at the north end of the field, and the Stampede Clubhouse structure at the south end of the field. Ancillary structure include a very large at grade scoreboard/television ("jumbotron") screen at the south end zone, a cable supported suspended scoreboard at centre field supported by four independent towers, and an ancillary structure located to south of the east grandstand.

The current proposal is to consider the modernization of the facility with increased seat count for the Olympic venue provided by temporary seating placed at the north and south ends.

North and South Temporary Seating

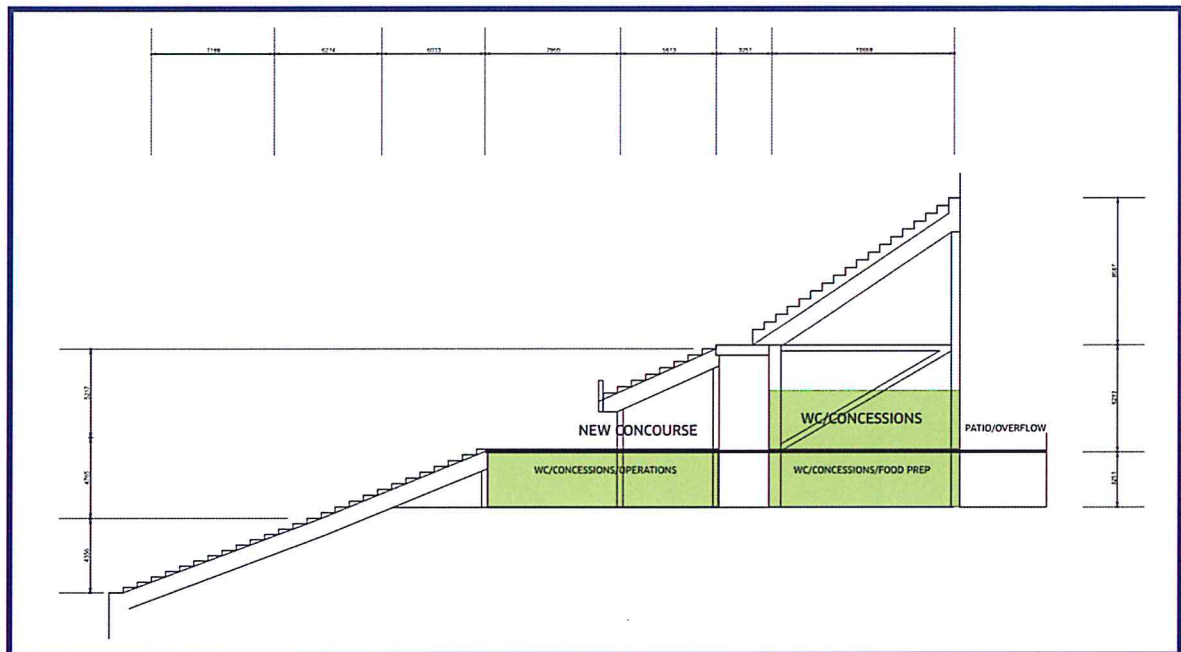
The Olympic Games will require a larger number of seats than the legacy uses. This will require the addition of temporary seating at the north and south ends of the facility. This is commonly achieved through the use of scaffold framing supporting aluminium seating tiers which can be arranged in a number of configurations. These systems are designed and supplied by a number of specialty contractors who can be selected on a competitive basis when an event is hosted. The main consideration for the permanent construction would be to provide an adequate base to support the framing system which may consist of temporary foundations such as screw piles or micropiles.

A Big Air scaffolding system could be integrated with one of the temporary seat scaffolding systems. Or alternatively the temporary seat scaffolding supplier could build around the Big Air scaffolding system.

Existing Grandstand Improvement Options

One option would be to improve the entry plaza, the existing concourses, concessions, and washrooms and potentially add more concessions. The new entry plaza and concessions could be standalone structures or structures integrated within the existing grandstand superstructure. A new concourse could be programmed into the existing grandstands by removing a portion of the existing rakers and adding a flat section framed in

either precast slab and beam elements or concrete on steel deck supported by structural steel elements. Additional lateral bracing can be achieved using either precast shear walls or structural steel bracing.



Ceremony Surface Support

Further investigation will be required to determine how best support the temporary ceremony stage and Big Air landing zone and minimize any potential damage to the existing artificial turf.

McMahon Stadium Feasibility Study

Mechanical

Prepared For:
Calgary Bid Exploration Committee via Dialog

Prepared by:



Consulting Engineers
Calgary, AB

Reference No. C17019-01
Date: February 24, 2017

1. Introduction

The use of McMahon Stadium as a host venue for the opening and closing ceremonies for the 2026 Winter Olympic Games is currently being explored. Two (2) scenarios are currently being vetted, one for 40,000 spectators and one for 55,000 spectators; the current capacity of the stadium is 34,500. Each of the options being explored would involve the addition of temporary seating for the additional spectators beyond the current stadium seating capacity.

The existing sanitary and storm water sewer capacity has been analyzed in order to determine the implications of each of the potential seating expansion options being explored. The intent is to provide a high-level summary of the mechanical system implications with sufficient detail for a preliminary cost estimate to be prepared.

The information provided in this study is based on the existing record drawings from 1979.

2. Background

1. Existing Sanitary Infrastructure

The main sanitary sewer service exits the stadium on the southwest corner of the site and is connected to a main located parallel to University Drive NW. The sanitary main leaving the site is a 10" diameter concrete line sloped at 9%.

Sanitary drainage from the building is collected from the east and west stadium areas via two gravity sanitary lines. The west line is an 8" diameter concrete line sloped at 1%, and the east line is a 10" diameter concrete line sloped at 0.8%.

Capacities of the east and west sanitary lines are as follows:

- East 10"Ø Main: 2,700 Fixture Units (FU's)
- West 8"Ø Main: 1,600 Fixture Units (FU's)
- Total Capacity: 4,300 Fixture Units (FU's)

A Fixture Unit is a unit of measure that defines the hydraulic load on the drainage system.

2. Existing Washroom Fixtures

The existing washroom groups are generally equally distributed between the east and west stands. The existing washroom fixtures impose a total load of 1,860 FU's on the existing sanitary system, approximately 930 FU's on the east and west mains. The following residual capacities remain for the east and west sanitary mains:

- East 10"Ø Main: 1,770 Fixture Units (FU's)
- West 8"Ø Main: 670 Fixture Units (FU's)
- Total Residual Capacity: 2,440 Fixture Units (FU's)

3. Existing Domestic Water Supply

The existing facility is supplied with domestic water by a 6" diameter line from the east side of the site from Crowchild Trail NW. A pressure and flow test of the incoming water supply must be performed in order to confirm the capacity of the existing water service. However, good design practice would suggest that the capacity of the existing water service is approximately 600 GPM.

4. Existing Storm Water Infrastructure

The primary storm water drainage main is located on the southwest corner of the site and runs parallel to the main sanitary sewer pipe. The storm water main is a 30" diameter concrete line sloped at 8.4% leaving the site, but shallows to 0.8% along the west side of the stadium. The maximum flowrate through the gravity storm main is approximately 22,288 GPM.

3. Expansion Scenarios & Analysis

An analysis of the existing washroom fixture count has determined that the existing facility is deficient in the number of washroom fixtures based on the current building code requirements. Newer stadiums typically exceed the number of code-required washroom fixtures based on the nature of the occupancy for sports facilities. The following scenarios will be analyzed in terms of the impact on the sanitary drainage systems:

1. Increased washroom fixtures based on current code requirements
2. Increased washroom fixtures based on "best practices" for similar new facilities
3. Increased washroom fixtures based on 40,000 spectators (5,500 additional spectators)
4. Increased washroom fixtures based on 55,000 spectators (20,500 additional spectators)

For each of the scenarios summarized above, it will be assumed that the potential additional washroom fixtures will be added equally between the east and west sanitary mains. The following table provides a summary of the additional sanitary sewer loading for each of the scenarios presented above:

Scenario	Additional Total Load (FU's)	Additional East / West Load (FU's)	Remaining East Capacity (FU's)	Remaining West Capacity (FU's)
Current	NA	NA	1,770	670
1	1,010	505	1,265	165
2	2,600	1,300	-35	-1,135
3	750	375	-410	-1,510
4	2,550	1,275	1,685	-2,785

A negative number indicates that sewer drain capacity is exceeded

An analysis of the results provided above indicates that insufficient capacity exists to support expansion scenarios 2, 3 & 4. It is also important to note that this analysis excludes the drainage load imposed by other sanitary load sources such as kitchen areas.

4. Summary & Conclusions

1. Sanitary System

There is sufficient sanitary drainage capacity to support the increase in washroom fixtures to the current code-required amount; an expansion of washroom fixtures beyond this amount would require substantial sanitary system upgrades including potential upsizing of sanitary mains or additional mains.

Recognizing that the additional seating that would be added for the Olympics (Scenarios 3 & 4) would be temporary, it is suggested that the most cost-effective solution is to provide temporary washroom facilities such as portable washroom trailers or portable toilets. The temporary washroom facilities would be equipped with on-board sanitary storage tanks such that no additional sanitary load would be imposed on the existing sanitary sewer system.

2. Domestic Water System

A pressure and flow test of the existing water supply must be performed in order to verify the exact capacity of the existing water service to the stadium. Based on the existing fixtures and the capacity estimate of 600 GPM, it is likely that the existing water service is at or near its maximum capacity. Temporary washroom facilities brought in for the Olympics would need to be complete with domestic water storage for hand washing and flushing purposes.

3. Storm Water System

The majority of the existing site is impervious in nature including the stadium and surrounding parking areas. The temporary seating brought in for the Olympics would be arranged on the already impervious areas, meaning that the existing rate of storm water run-off would not change substantially from its current amount; as such, the existing storm water system is deemed to be sufficient for the potential temporary seating expansion scenarios.

February 28, 2017

DIALOG Design
300, 134 – 11 Avenue SE
Calgary, AB T2G 0X5

Attention: Rob Adamson and Doug Cinnamon

Re: CBEC – McMahon Stadium Potential Opening and Closing Ceremony Venue (R1.0)
Designcore Project # 17038

Please find attached our report outlining the electrical capacity for McMahon Stadium Facility. Our report will outline the current electrical, lighting and communications capacity as well as outline some of the upgrades that will be required to utilize the facility for the potential Opening and Closing Ceremony Venue.

If you have any questions, please do not hesitate to contact me directly at (403) 269-2125.

Sincerely,



Rick Robertson, P.Eng. LEED®AP
Principal
Designcore Engineering Ltd.

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ATTACHMENTS:

- E 1.1 EXISTING INCOMING COMMUNICATIONS SERVICES
- E 2.1 EXISTING SINGLE LINE



1.0 Introduction

Designcore Engineering Ltd. has been retained to review the existing electrical systems and to evaluate the ability to upgrade with respect to hosting the Opening and Closing Ceremonies for the Winter Olympics at the McMahon Stadium. Designcore has performed an on-site review of the existing systems and upgrade potential of the following: power capacity, power redundancy, lighting systems and communications infrastructure including fibre services to the building. Attached to this report are a series of sketches indicating existing power and communications infrastructure.

2.0 Existing Power Capacities

McMahon Stadium is fed from an ENMAX substation located at Memorial Dr. and Crowchild Tr. SW. The single radial feeder is shared with other customers. Our understanding after a preliminary conversation with ENMAX is the feeder is capable of supplying 6.0 MVA of power. There is no redundancy from the utility currently.

The medium voltage ENMAX feeder routing is mostly underground however the feeder rises up and runs via an overhead power line on wood poles for the portion starting at the intersection of Crowchild Trail and 16th Avenue NW to the stadium.

The facility is primary metered by Enmax at 13,200 volts, 3 phase. The facility distributes the power at both 13,200 volts 3 phase and 4,160 volts 3 phase to feed transformers at different locations within the facility. The operating voltages with the facility is a combination of 347/600 volt 3 phase and 120/208 volt 3 phase.

Refer to the attached single line for additional information.

3.0 Power Capacity Upgrades

At this point we have not been able to confirm with ENMAX the total capacity available at the substation. It is anticipated additional power could be available. The method of getting the power to the site is not confirmed at this point.

4.0 Necessary Upgrades to Accommodate Backup Requirements

As indicated in the Standing Offer Proposal Form (SOPF), the intent appears to be for generated power to feed the facility with additional generators to be used as a redundant power supply. There is sufficient space in the parking lot to the west of the facility to locate any generators that are required.

To accomplish this there will need to be temporary power cables installed to connect to the main power system.

All the synchronizing equipment, etc. would be temporary and be installed as part of the generator rental.



5.0 Existing Lighting System

The existing lighting system is currently designed for television broadcast of professional football games. The existing system however falls significantly short of the desired 2000 lux levels. The lighting is currently from 2 sides, the east and west. The Olympic criteria requires lighting from minimum 3 sides.

6.0 Lighting System Upgrades

A new lighting system will be required to accommodate the lighting requirements for broadcasting. The new system would be an LED source. This would include lighting from the east and west sides as well as new lighting being introduced on the northeast and northwest sides as well as the southeast and southwest sides.

7.0 Existing Communications Infrastructure

The facility is currently supported by both Telus and Shaw fibre infrastructure.

Telus currently enters McMahon Stadium on both the west and the east side. On the west side, Telus currently has 24 strands of fibre of which 8 are currently in use. On the east side, Telus currently has 24 strands of fibre of which 6 are currently in use.

Shaw currently has 48 strands of fibre entering McMahon Stadium.

See attached site plans indicating the location of the fibre infrastructure.

8.0 Communication Infrastructure Upgrades

According to the information available from Telus and Shaw, there would be additional underground ducts required to facilitate new fibre that would be required.

Both Telus and Shaw currently have radial ducts entering McMahon Stadium site. Along with the quantity of ducts there may also be a requirement for redundant paths to the site.

END OF REPORT



CBEC STUDY

McMahon Stadium

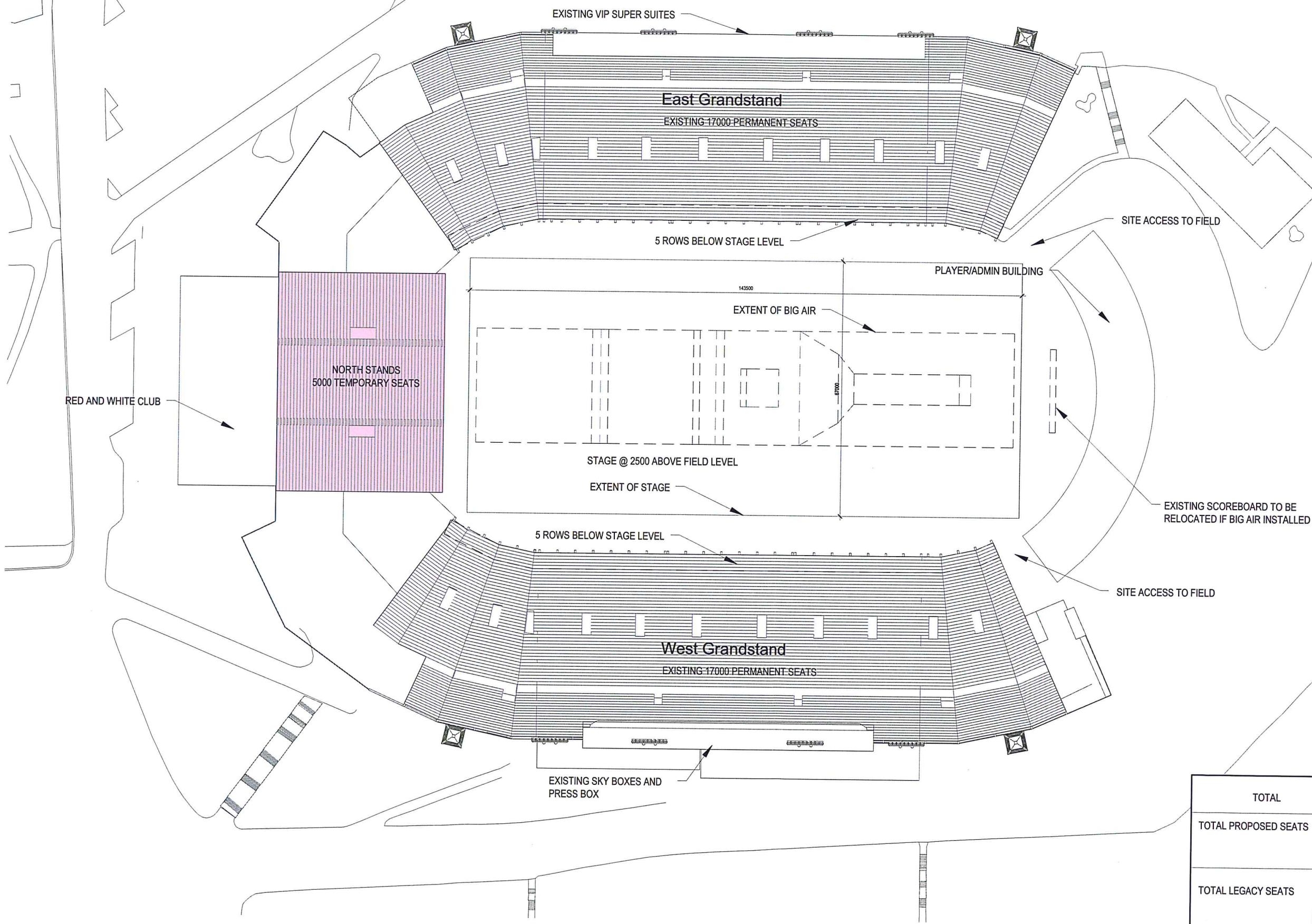
Option 1

FOR COSTING PURPOSE ONLY

40,000 Spectators
No Renovations
Big Air Option

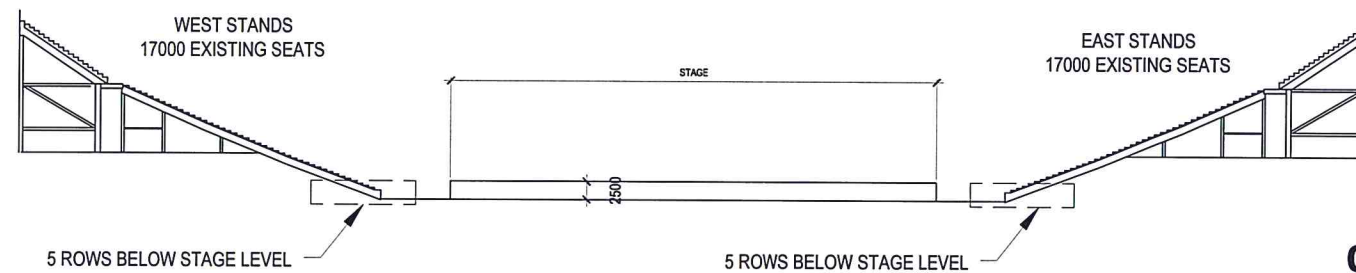
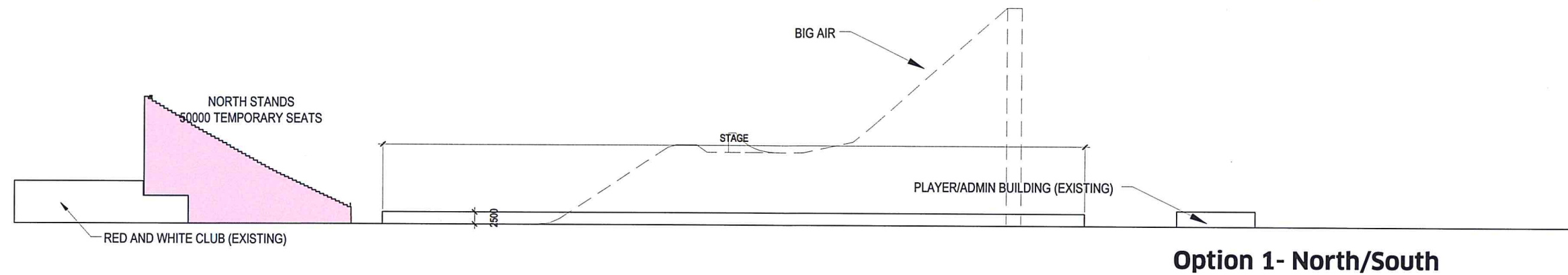
McMahon - OPTION 1

40,000 Spectators



	PERMANENT SEATS	TEMPORARY SEATS/AREA
	35400 (EXISTING)	5000 / 2500m2 (NORTH STANDS)
TOTAL	35400	5000 / 2500 m2
TOTAL PROPOSED SEATS	40400	
TOTAL LEGACY SEATS	35400	

McMahon - OPTION 1 Sections + Description



DESCRIPTION

Option 1 completes no renovations or upgrades to McMahon stadium. To reach 40,000 spectators, 5000 temporary seats are added to the north end of the stadium.

If McMahon Stadium is used for the Big Air competition, the jump will be installed in the middle of the infield. This will allow good sightlines from roughly half of the west and east grandstands, as well as any temporary seating placed on the north.

There is no legacy component with Option 1.

WASHROOMS

With 40,000 spectators, temporary washrooms are required to meet Building Code minimum requirements. 60 total temporary water closets are required. (Male; 12 urinals, 6 W/C, 2 HC. Female; 36 W/C, 4 HC)

To meet a recommended water closet count, based on stadiums of similar size, 354 temporary water closets are required (Male; 78 urinals, 28 W/C, 34 HC. Female; 149 W/C, 32 HC. 33 universal W/C)

CBEC STUDY

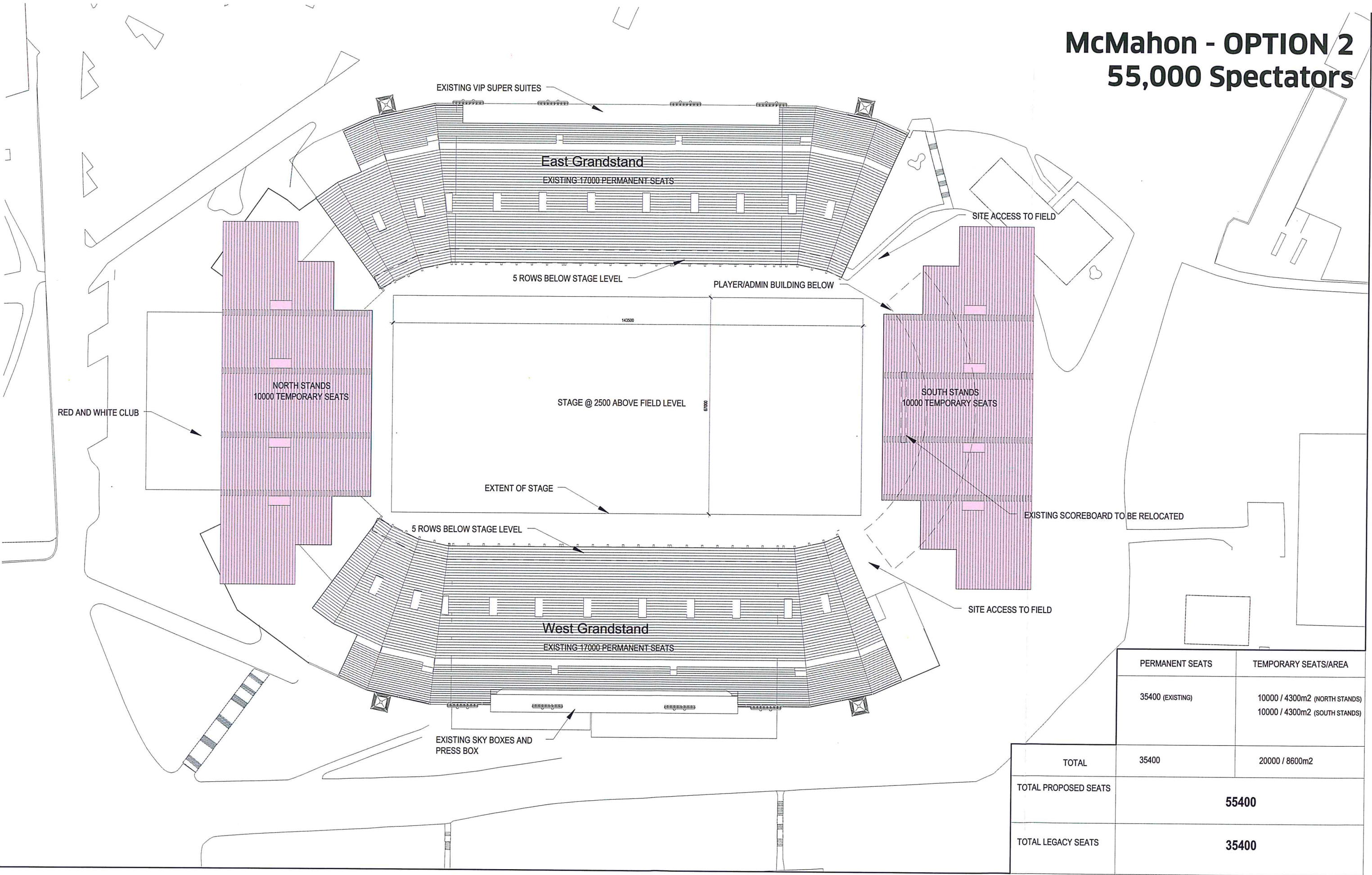
McMahon Stadium

Option 2

FOR COSTING PURPOSE ONLY

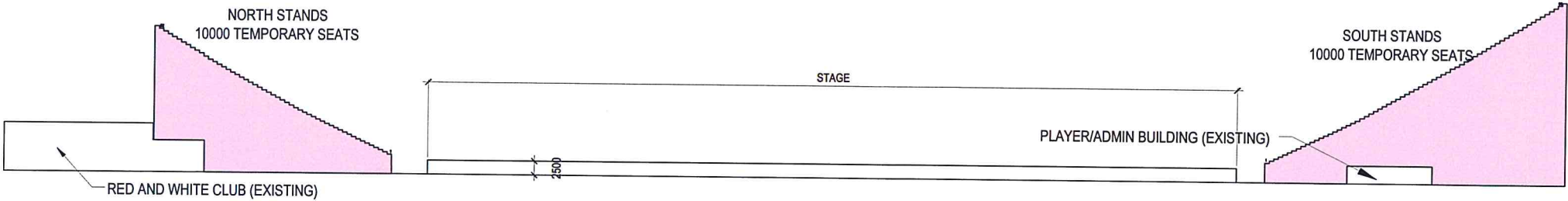
55,000 Spectators
No Renovations

McMahon - OPTION 2
55,000 Spectators

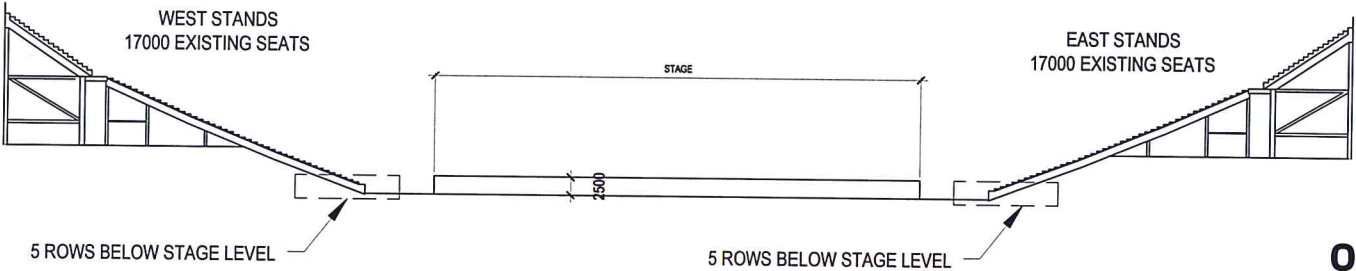


	PERMANENT SEATS	TEMPORARY SEATS/AREA
	35400 (EXISTING)	10000 / 4300m2 (NORTH STANDS) 10000 / 4300m2 (SOUTH STANDS)
TOTAL	35400	20000 / 8600m2
TOTAL PROPOSED SEATS	55400	
TOTAL LEGACY SEATS	35400	

McMahon - OPTION 2 Sections + Description



Option 2 - North/South



Option 2 - East/West

DESCRIPTION

Option 2 completes no renovations or upgrades to McMahon stadium. In Option 2A, to reach 55,000 spectators 10,000 temporary seats are added to the north end of the stadium and 10,000 temporary seats are added to the south end of the stadium.

There is no legacy component with Option 2A or 2B

WASHROOMS

With 55,000 spectators, temporary washrooms are required to meet Building Code minimum requirements. 185 total temporary water closets are required. (Male; 37 urinals, 19 W/C, 6 HC. Female; 111 W/C, 12 HC)

To meet a recommended water closet count, based on stadiums of similar size, 576 temporary water closets are required (Male; 143 urinals, 50 W/C, 48 HC. Female; 243 W/C, 46 HC. 46 universal W/C)

CBEC STUDY

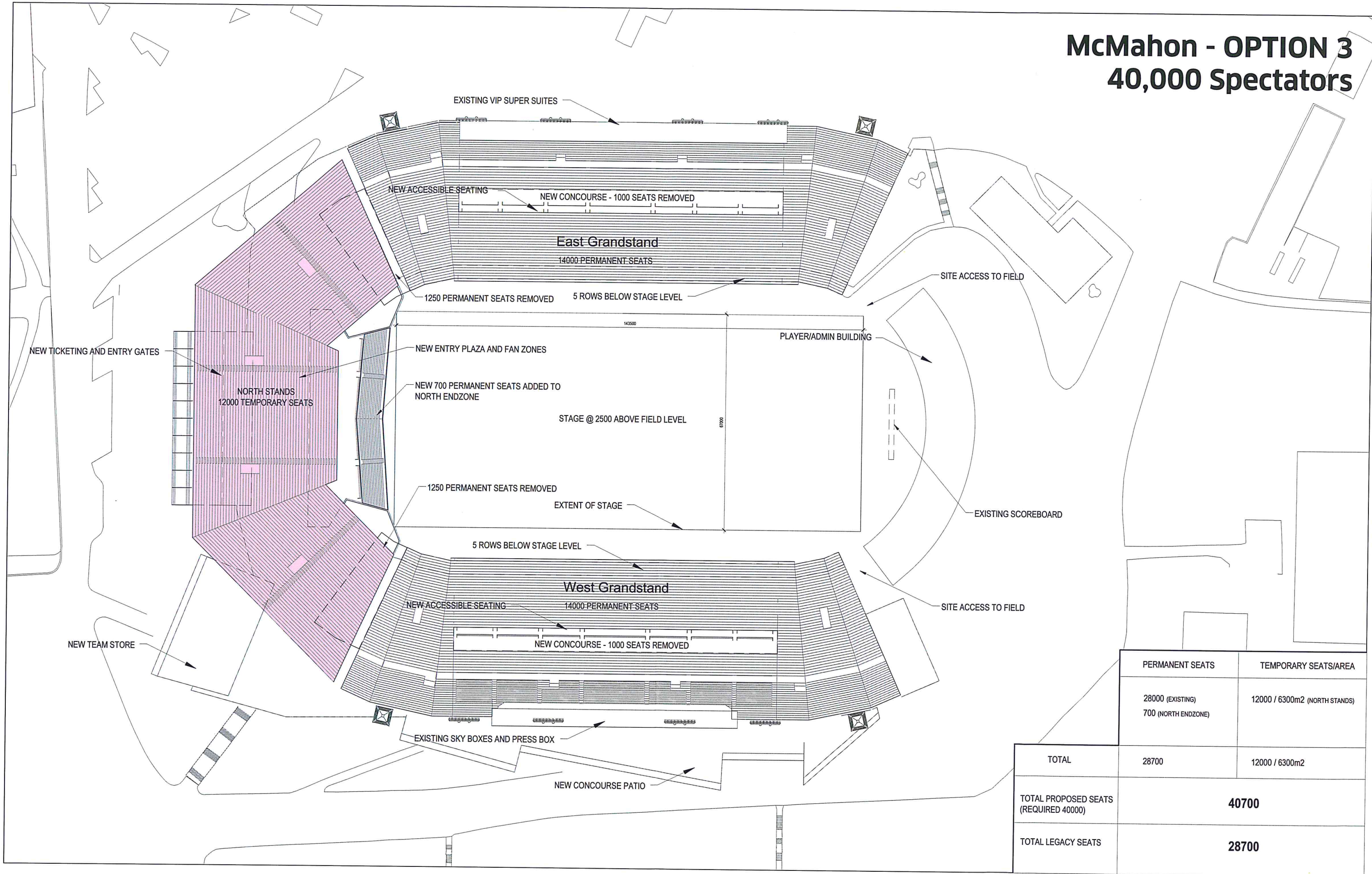
McMahon Stadium

Option 3

40,000 Spectators
Legacy Upgrades

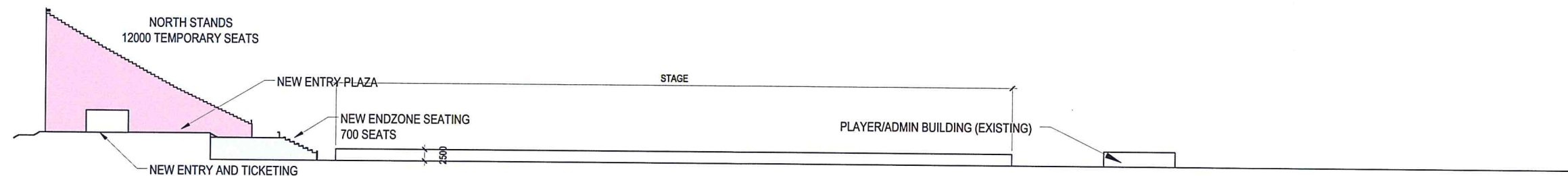
FOR COSTING PURPOSE ONLY

McMahon - OPTION 3
40,000 Spectators

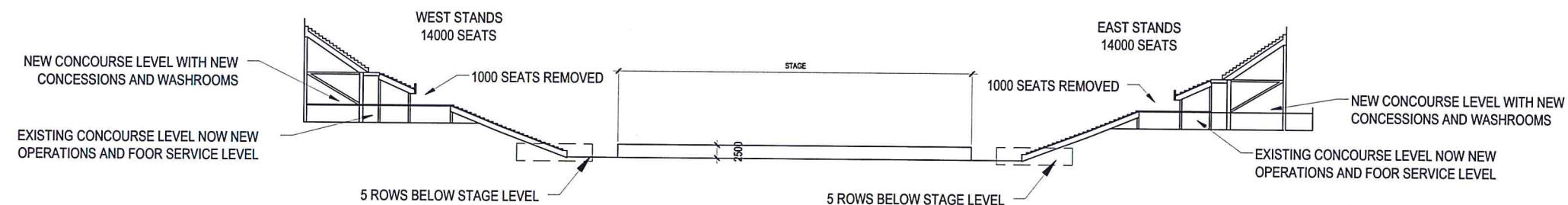


	PERMANENT SEATS	TEMPORARY SEATS/AREA
	28000 (EXISTING) 700 (NORTH ENDZONE)	12000 / 6300m2 (NORTH STANDS)
TOTAL	28700	12000 / 6300m2
TOTAL PROPOSED SEATS (REQUIRED 40000)	40700	
TOTAL LEGACY SEATS	28700	

McMahon - OPTION 3 Sections + Description



Option 3- North/South



Option 3 - East/West

SUMMARY OF LEGACY COMPONENT

- New entry plaza
- New ticketing windows
- New fan zones @ north endzone
- New retail store
- New concourse level, open to field of play
- New washrooms and renovated washrooms
- New accessible and companion seating
- New stadium seats for the lower bowl
- New food prep kitchen
- Permanent seating reduced to 28,700 seats

DESCRIPTION

With the the renovations and upgrades completed prior to the Olympics, the permanent seat count will be 28,700. To reach 40,000 spectators, 12,000 temporary seats will be added to the north endzone.

WASHROOMS

With the renovations and upgrades completed to McMahon stadium prior to the games, no temporary washrooms are required to meet Building Code minimum requirements with 40,000 spectators.

To meet a recommended water closet count, based on stadiums of similar size, 177 temporary water closets are required (Male; 52 urinals, 18 W/C, 11 HC. Female; 75 W/C, 11 HC. 10 universal W/C)

CBEC STUDY

McMahon Stadium

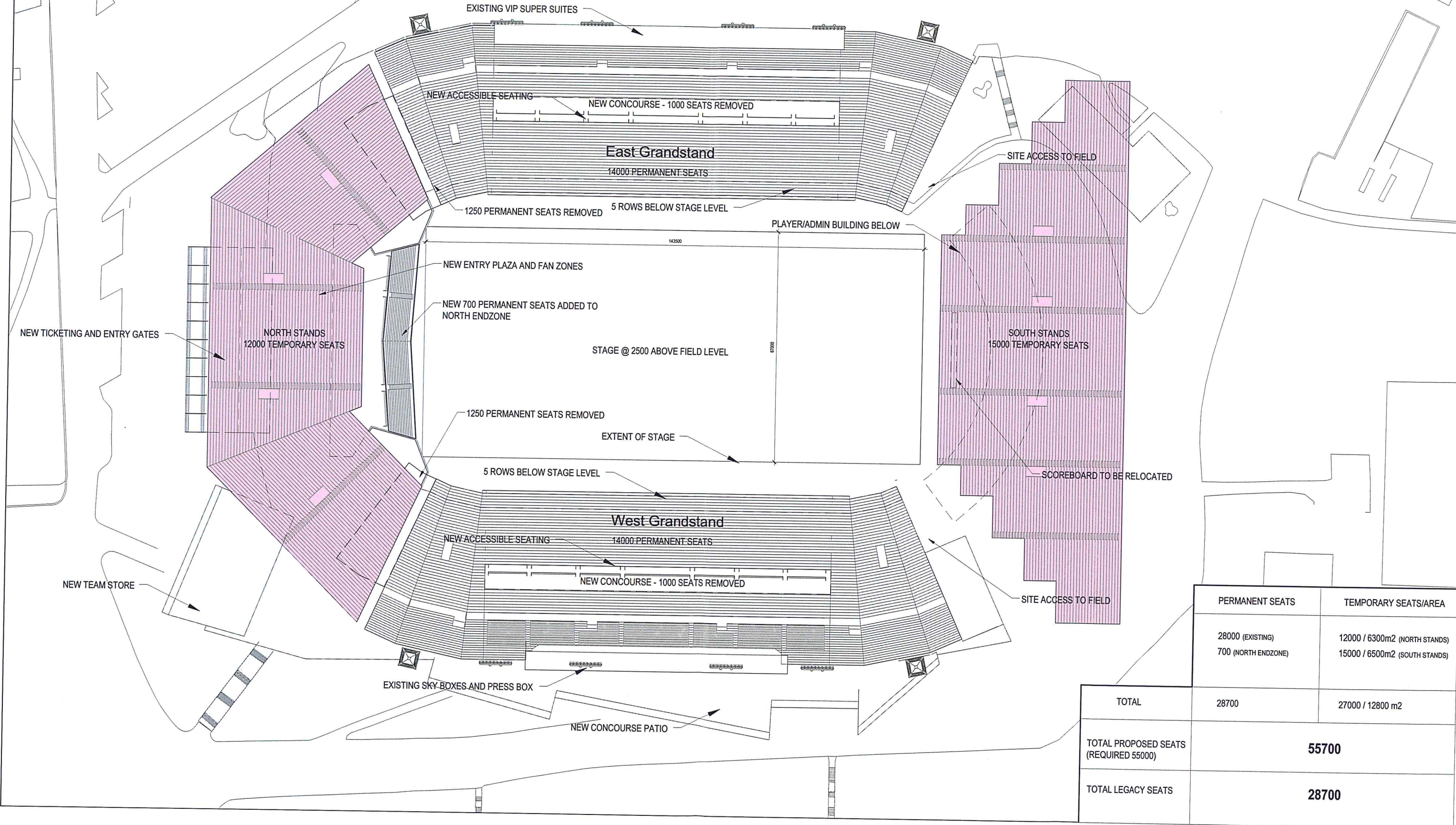
Option 4

55,000 Spectators
Legacy Upgrades

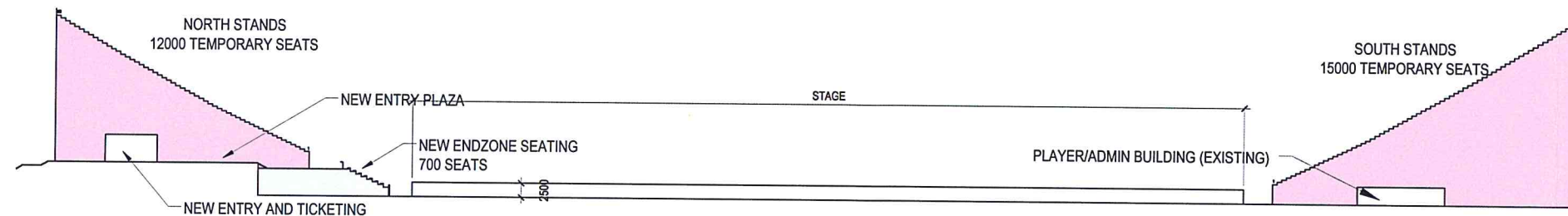
FOR COSTING PURPOSE ONLY

McMahon - OPTION 4

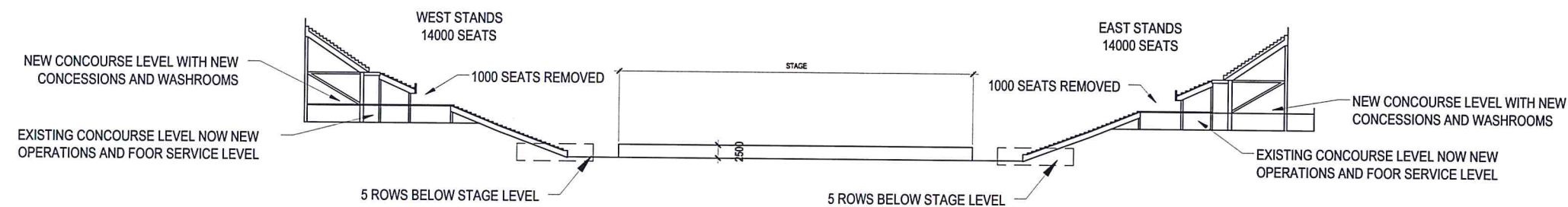
55,000 Spectators



McMahon - OPTION 4 Sections + Description



Option 4 - North/South



Option 4 - East/West

SUMMARY OF LEGACY COMPONENT

- New entry plaza
- New ticketing windows
- New fan zones @ north endzone
- New retail store
- New concourse level, open to field of play
- New washrooms and renovated washrooms
- New accessible and companion seating
- New stadium seats for the lower bowl
- New food prep kitchen
- Permanent seating reduced to 28,700 seats

DESCRIPTION

With the the renovations and upgrades completed prior to the Olympics, the permanent seat count will be 28,700. To reach 55,000 spectators, 12,000 temporary seats will be added to the north endzone, and 15,0000 temporary seats will be added to the south endzone.

WASHROOMS

With the renovations and upgrades completed to McMahon stadium prior to the games, temporary washrooms are required to meet Building Code minimum requirements with 55,000 spectators. 57 temporary water closets are required (Male; 11 urinals, 9 W/C, 0 HC. Female; 37 W/C, 0 HC)

To meet a recommended water closet count, based on stadiums of similar size, 399 temporary water closets are required (Male; 117 urinals, 40 W/C, 25 HC. Female; 169 W/C, 25 HC. 23 universal W/C)

SUMMARY OF LEGACY COMPONENT

New entry plaza
New ticketing windows
New fan zones @ north endzone
New retail store
New concourse level, open to field of play
New washrooms and renovated washrooms
New accessible and companion seating
New stadium seats for the lower bowl
New food prep kitchen
Permanent seating reduced to 28,700 seats

LEGACY COMPONENT DESCRIPTION

Beginning at the north end of the stadium we propose a new entry plaza. The North Plaza is a community gathering space that can be used as a pre-event space or in general as a wider community resource. It includes enhanced ticketing and retail store that is accessible from both the exterior and interior of the stadium. The entry will have direct access from a new tailgating zone and bbq area. From the new entry plaza fans will proceed either to the West or the East grandstands. It is important to note that the new entry will also serve as a new end zone concourse level that creates a connection from east to west.

Working on the existing grandstands we will create a new concourse level and open the concourse with views to the field of play. This new concourse will be approximately 10 feet above the current concourse. This removes approximately

8 rows of seating, a loss of approximately, while filling in the old vomms with seats (2000 seats removed). The old concourse will become a new prep kitchen offering food prepared on site for the first time. This will greatly enhance the quality of food service.

The new enhanced concourse will provide a level of fan experience never before possible in McMahon Stadium by creating a zone where fans can be on the concourse and also still visually connected to the game. This concourse will also allow for all new concessions and washrooms that will be representative of the standard of service at competing CFL stadiums.

As part of this renovation to the stadium we would also add new club zones at the north end of the grandstands adjacent

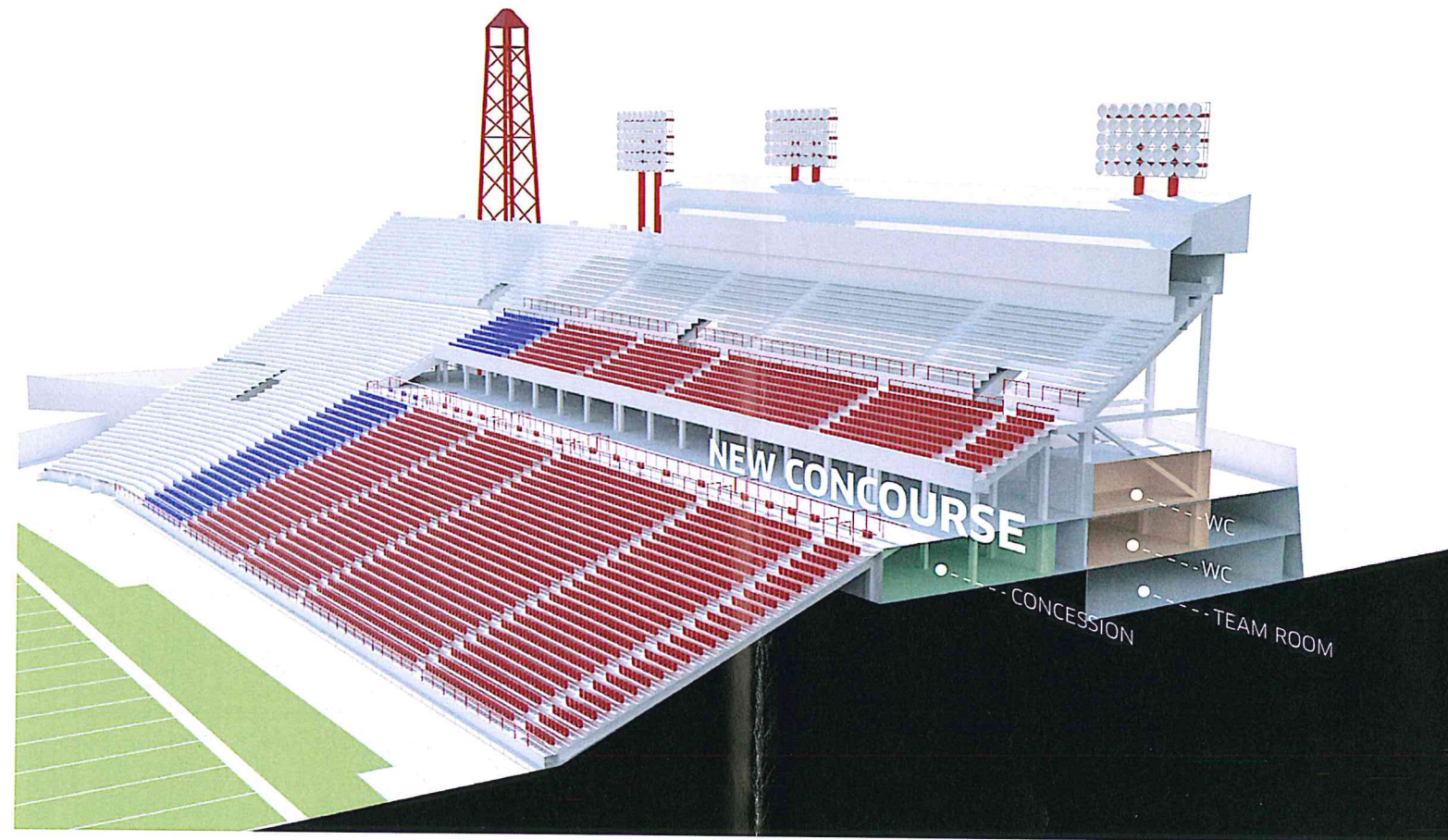
McMahon Legacy Component FOR COSTING PURPOSE ONLY

to the end zone. These patios would be near the end zone and would create enhanced fan zones and a new level of game experience. As part of the new patios we would remove sections L and M of the grandstand. This would reduce the total seating capacity by (2470 seats). These are not great game seats and in our opinion the patios would provide a better game time experience.

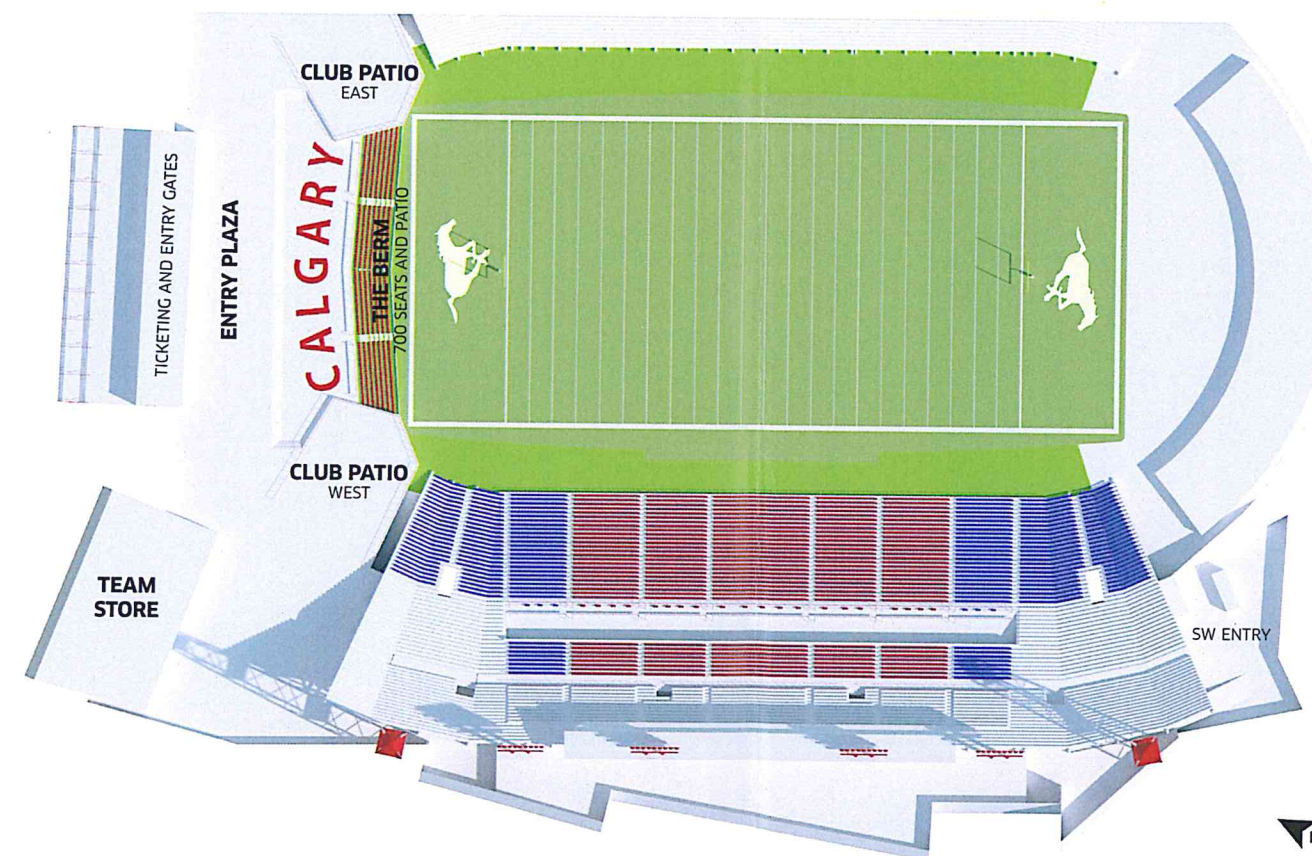
The exterior perimeter walls of the stadium would be enhanced and expanded. These walls would create larger concourses and provide the fans area to hang out during the game.

New 20" and 21" seats would be added to the lower seating bowl on the west.

McMahon Legacy Component

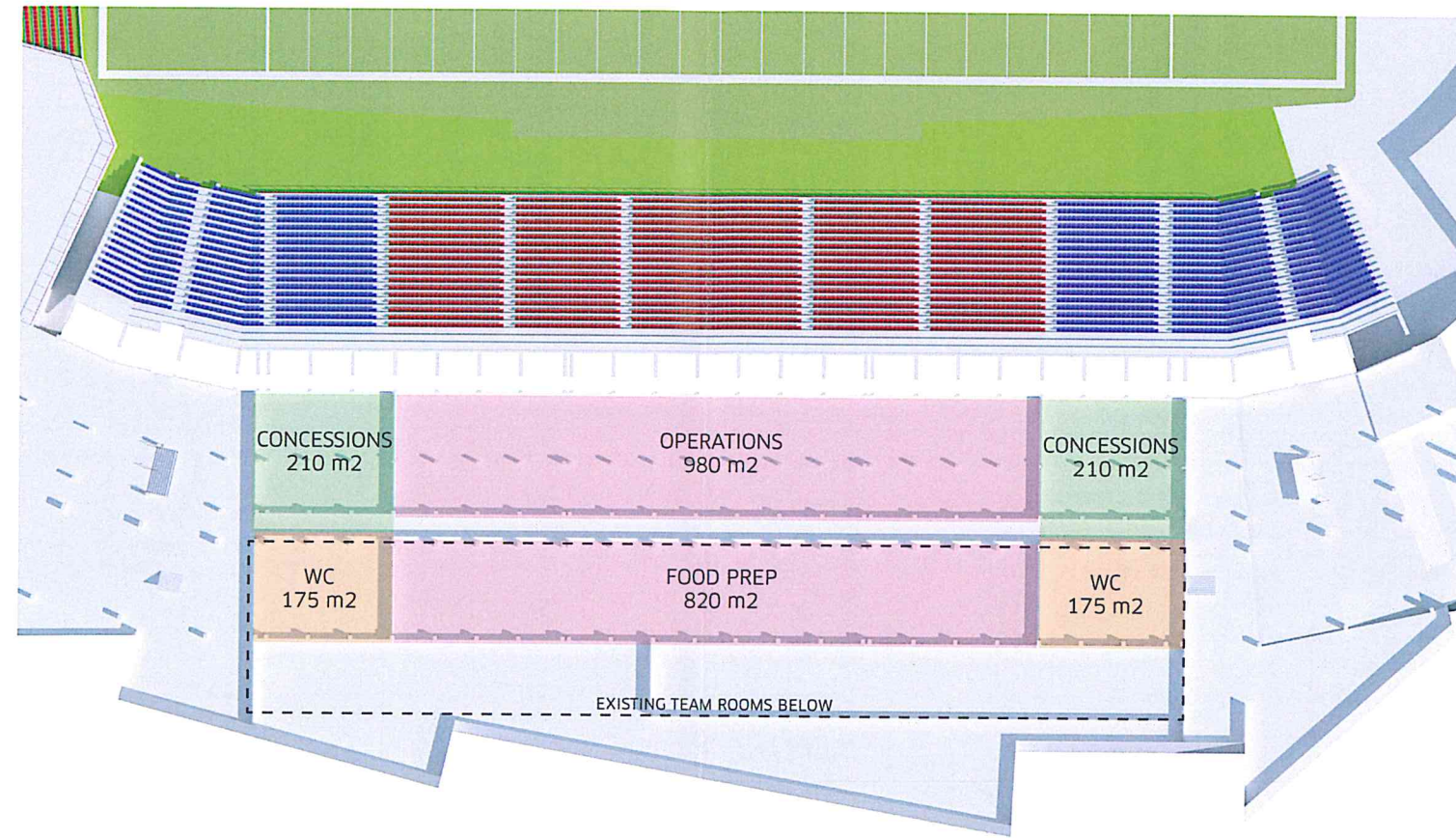


Grandstand Section

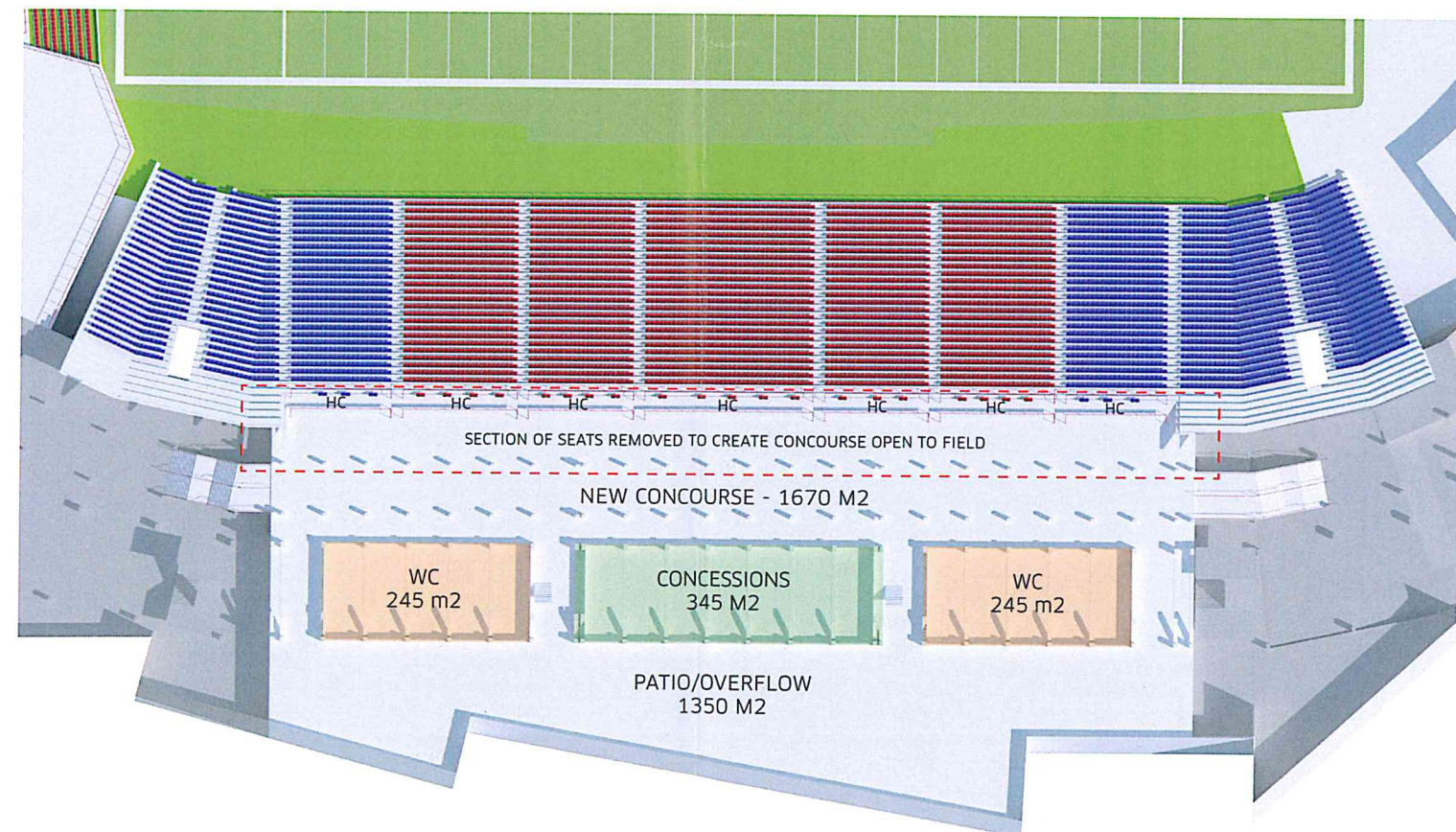


Stadium Plan

McMahon Legacy Component



Lower Concourse



New Concourse

		OPTION 3				OPTION 4				OPTION 1				OPTION 2			
		Permanent Existing	New	Temporary Minimum	Recmd	Permanent Existing	New	Temporary Minimum	Recmd	Permanent Existing	New	Temporary Minimum	Recmd	Permanent Existing	New	Temporary Minimum	Recmd
Spectators	Permanent			28000				28000				35400				35400	
	Temporary			12000				27000				5000				20000	
MALE	Urinal	96	26	0	52	96	26	11	117	96	0	12	78	96	0	37	143
	WC	31	10	0	18	31	10	9	40	31	0	6	28	31	0	19	50
	HC	2	23	0	11	2	23	0	25	2	0	2	34	2	0	6	48
Female	WC	101	74	0	75	101	74	37	169	101	0	36	149	101	0	111	243
	HC	4	21	0	11	4	21	0	25	4	0	4	32	4	0	12	46
Universal		0	23	0	10	0	23	0	23	0	0	0	33	0	0	0	46
Total		234	177	0	177	234	177	57	399	234	0	60	354	234	0	185	576

BUILDING CODE

Water Closets – 3.7.2.2 (6), table 3.7.2.2.A

Urinals - – 3.7.2.2 (5)

Male - 7 plus 1 for each additional increment of 200 males in excess of 400

Female - 12 plus 1 for each additional increment of 100 females in excess of 400

Urinals are permitted to be substituted for two thirds of the number of water closets required by this Article for males.

Occupant Load is equally divided between males and females unless the proportion of each sex expected can be determined with reasonable accuracy

Universal - 3.8.2.3 (7)

If more than one water closet is provided in a washroom, a barrier-free stall shall be provided for every 10 stalls or part thereof

3.8.2.3 (4)

If alterations are made to an existing building, universal toilet rooms conforming to Article 3.8.3.12 are permitted to be provided in lieu of facilities for persons with physical disabilities in washrooms used by the general public.

Grandstand Washroom Fixture Counts

<div> <div></div> <div>OPTION 1</div> <div>40,000 Seats</div> </div>									
Major Occupancy	A-4 Stadia and Grandstands								ABC Table 3.1.2.1
Proposed New Seats	New Temporary Seats				New Permanent Seats				
	15000				12300				
Occupant Load	Men	Women	Universal*		Men	Women	Universal*		ABC Table 3.1.17.1
	7500	7500			6150	6150			
Fixtures required	Urinals	WC	WC	WC	Urinals	WC	WC	WC	
By code	28	15	84		24	12	71		
Recommended*	66	23	94	13	54	19	77	11	
Barrier-free stall required by code		5	9			4	8		ABC 3.8.2.3 (6) ABC 3.8.2.3 (7)
Barrier-free stall recommended*		14	14			12	12		
Notes: 3.8.2.3 (3) In a building in which water closets are required in accordance with Subsection 3.7.2., atleast one barrier-free water closet shall be provided in the entrance storey, unless a) a barrier-free path of travel is provided to barrier-free water closets elsewhere in the building, or b) The water closets required by Subsection 3.7.2. are for dwelling units only. 3.8.2.3 (6) If more than one water closet is provided in a washroom, a barrier-free stall shall be provided for every 10 stalls or part thereof. 3.8.2.3 (7) For temporary uses, such as outdoor fairs and festivals, a barrier-free stall shall be provided for every 10 stalls or part thereof. * Recommended washroom count based on washroom ratios per spectator of newer CFL stadiums. (Universal washrooms to be counted as part of the total requirements).									

Revised 09/03/2017

For costing propose only

Grandstand Washroom Fixture Counts

OPTION 2 55,000 Seats									
Major Occupancy	A-4 Stadia and Grandstands								ABC Table 3.1.2.1
Proposed New Seats	New Temporary Seats				New Permanent Seats				
	32400				9500				
Occupant Load	Men	Women	Universal*		Men	Women	Universal*		ABC Table 3.1.17.1
	16200	16200			4750	4750			
Fixtures required	Urinals	WC	WC	WC	Urinals	WC	WC	WC	
By code	58	28	171		20	9	57		
Recommended*	141	48	203	27	42	14	60	8	
Barrier-free stall required by code		9	18			3	6		ABC 3.8.2.3 (6) ABC 3.8.2.3 (7)
Barrier-free stall recommended*		30	30			9	9		
Notes: 3.8.2.3 (3) In a building in which water closets are required in accordance with Subsection 3.7.2., atleast one barrier-free water closet shall be provided in the entrance storey, unless a) a barrier-free path of travel is provided to barrier-free water closets elsewhere in the building, or b) The water closets required by Subsection 3.7.2. are for dwelling units only. 3.8.2.3 (6) If more than one water closet is provided in a washroom, a barrier-free stall shall be provided for every 10 stalls or part thereof. 3.8.2.3 (7) For temporary uses, such as outdoor fairs and festivals, a barrier-free stall shall be provided for every 10 stalls or part thereof. * Recommended washroom count based on washroom ratios per spectator of newer CFL stadiums. (Universal washrooms to be counted as part of the total requirements).									

Grandstand Washroom Fixture Counts

OPTION 3 40,000 Seats									
Major Occupancy	A-4 Stadia and Grandstands								ABC Table 3.1.2.1
Proposed New Seats	New Temporary Seats				New Permanent Seats				
	15000				13000				
Occupant Load	Men	Women	Universal*		Men	Women	Universal*		ABC Table 3.1.17.1
	7500	7500			6500	6500			
Fixtures required	Urinals	WC	WC	WC	Urinals	WC	WC	WC	
By code	28	15	84		26	12	74		
Recommended*	66	23	94	13	57	20	163	11	
Barrier-free stall required by code		5	9			4	8		ABC 3.8.2.3 (6) ABC 3.8.2.3 (7)
Barrier-free stall recommended*		14	14			12	12		
Notes: 3.8.2.3 (3) In a building in which water closets are required in accordance with Subsection 3.7.2., atleast one barrier-free water closet shall be provided in the entrance storey, unless a) a barrier-free path of travel is provided to barrier-free water closets elsewhere in the building, or b) The water closets required by Subsection 3.7.2. are for dwelling units only. 3.8.2.3 (6) If more than one water closet is provided in a washroom, a barrier-free stall shall be provided for every 10 stalls or part thereof. 3.8.2.3 (7) For temporary uses, such as outdoor fairs and festivals, a barrier-free stall shall be provided for every 10 stalls or part thereof. * Recommended washroom count based on washroom ratios per spectator of newer CFL stadiums. (Universal washrooms to be counted as part of the total requirements).									

Grandstand Washroom Fixture Counts

OPTION 4 55,000 Seats									
Major Occupancy	A-4 Stadia and Grandstands								ABC Table 3.1.2.1
Proposed New Seats	New Temporary Seats				New Permanent Seats				
	28200				13000				
Occupant Load	Men	Women	Universal*		Men	Women	Universal*		ABC Table 3.1.17.1
	14100	14100			6500	6500			
Fixtures required	Urinals	WC	WC	WC	Urinals	WC	WC	WC	
By code	51	25	150		26	12	74		
Recommended*	123	42	177	24	57	20	163	11	
Barrier-free stall required by code		8	15			4	8		ABC 3.8.2.3 (6) ABC 3.8.2.3 (7)
Barrier-free stall recommended*		26	26			12	12		
Notes: 3.8.2.3 (3) In a building in which water closets are required in accordance with Subsection 3.7.2., at least one barrier-free water closet shall be provided in the entrance storey, unless a) a barrier-free path of travel is provided to barrier-free water closets elsewhere in the building, or b) The water closets required by Subsection 3.7.2. are for dwelling units only. 3.8.2.3 (6) If more than one water closet is provided in a washroom, a barrier-free stall shall be provided for every 10 stalls or part thereof. 3.8.2.3 (7) For temporary uses, such as outdoor fairs and festivals, a barrier-free stall shall be provided for every 10 stalls or part thereof. * Recommended washroom count based on washroom ratios per spectator of newer CFL stadiums. (Universal washrooms to be counted as part of the total requirements).									

SUMMARY

WEST GRANDSTAND

New entry plaza and crush space

New ticketing windows

Fan zones near the end zone

New retail store

New concourse level

Open new concourse level to the field of play

New washrooms and renovated washrooms

New accessible and companion seating

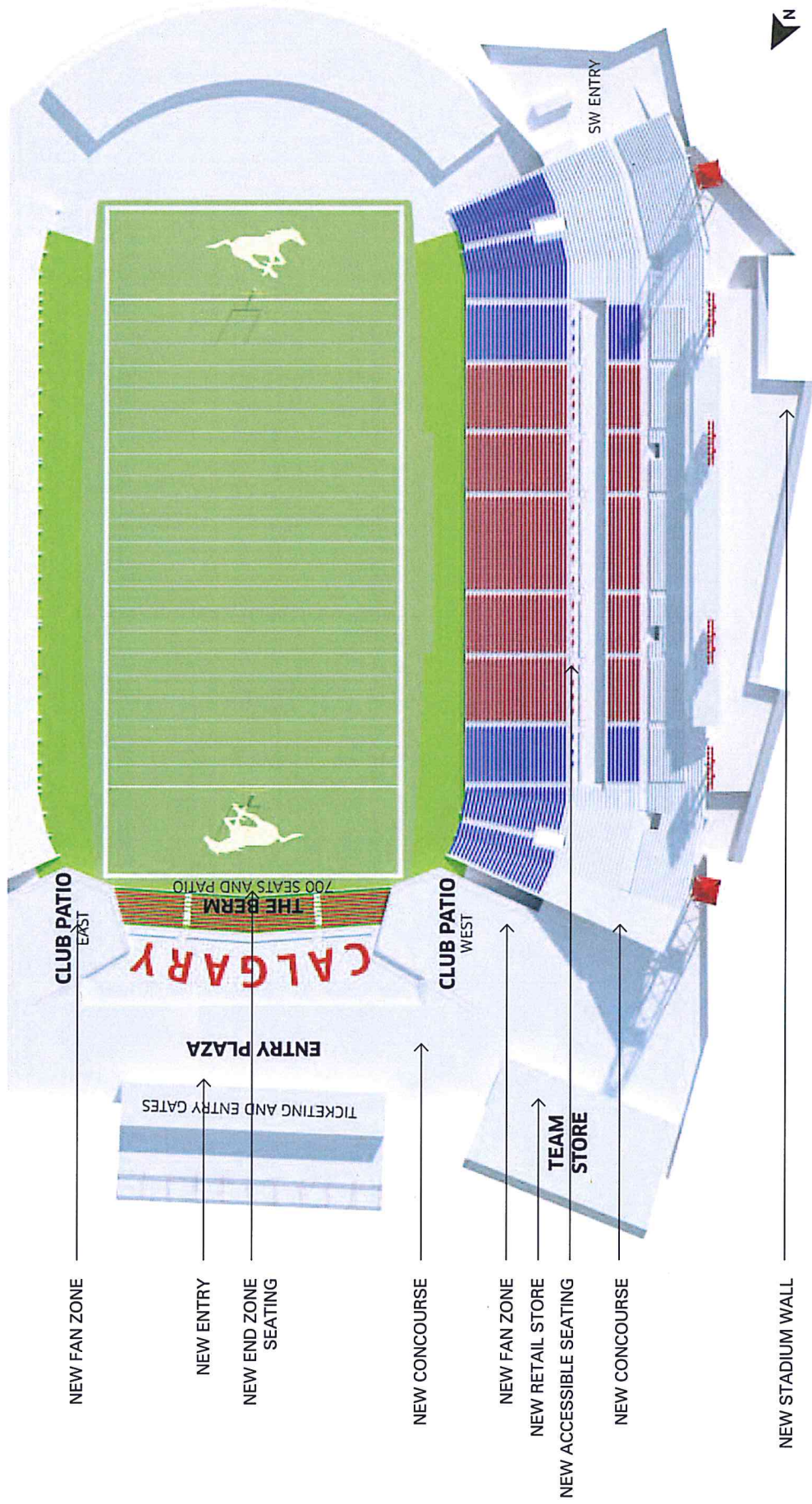
New wayfinding

New stadium seats for the lower bowl

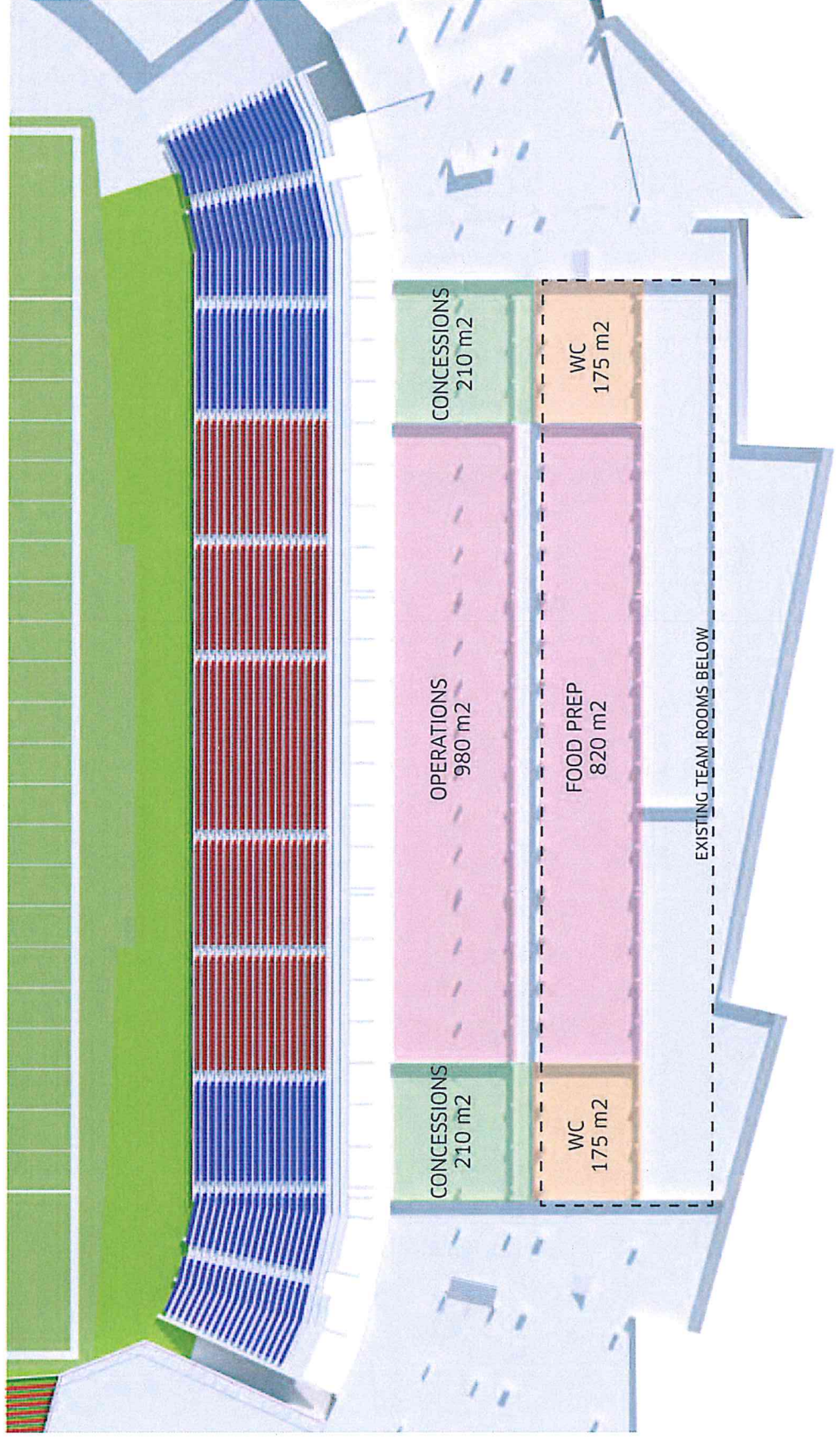
New food prep kitchen

All accomplished in 8 months

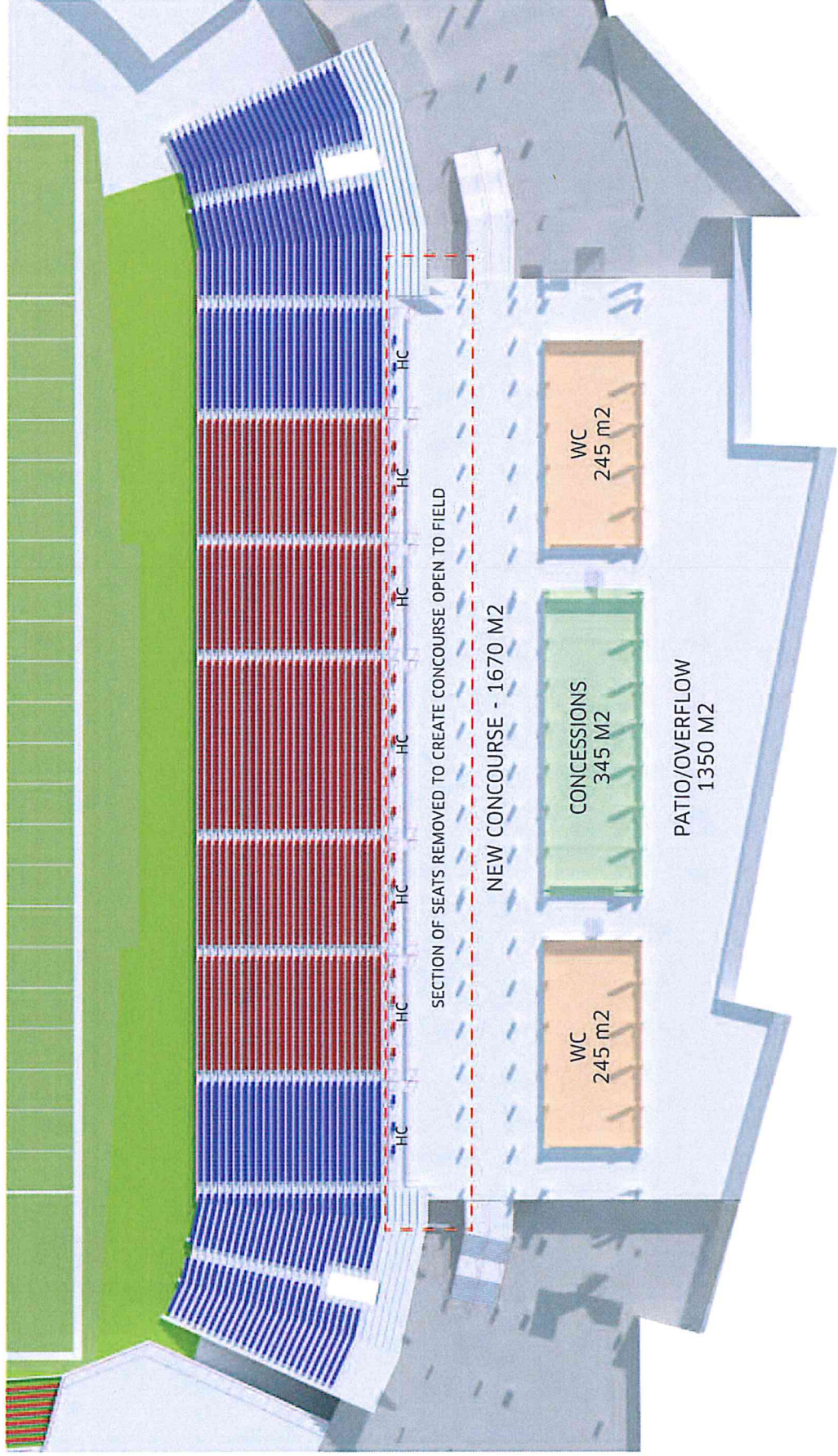
WEST GRAND STAND UPPER LEVEL



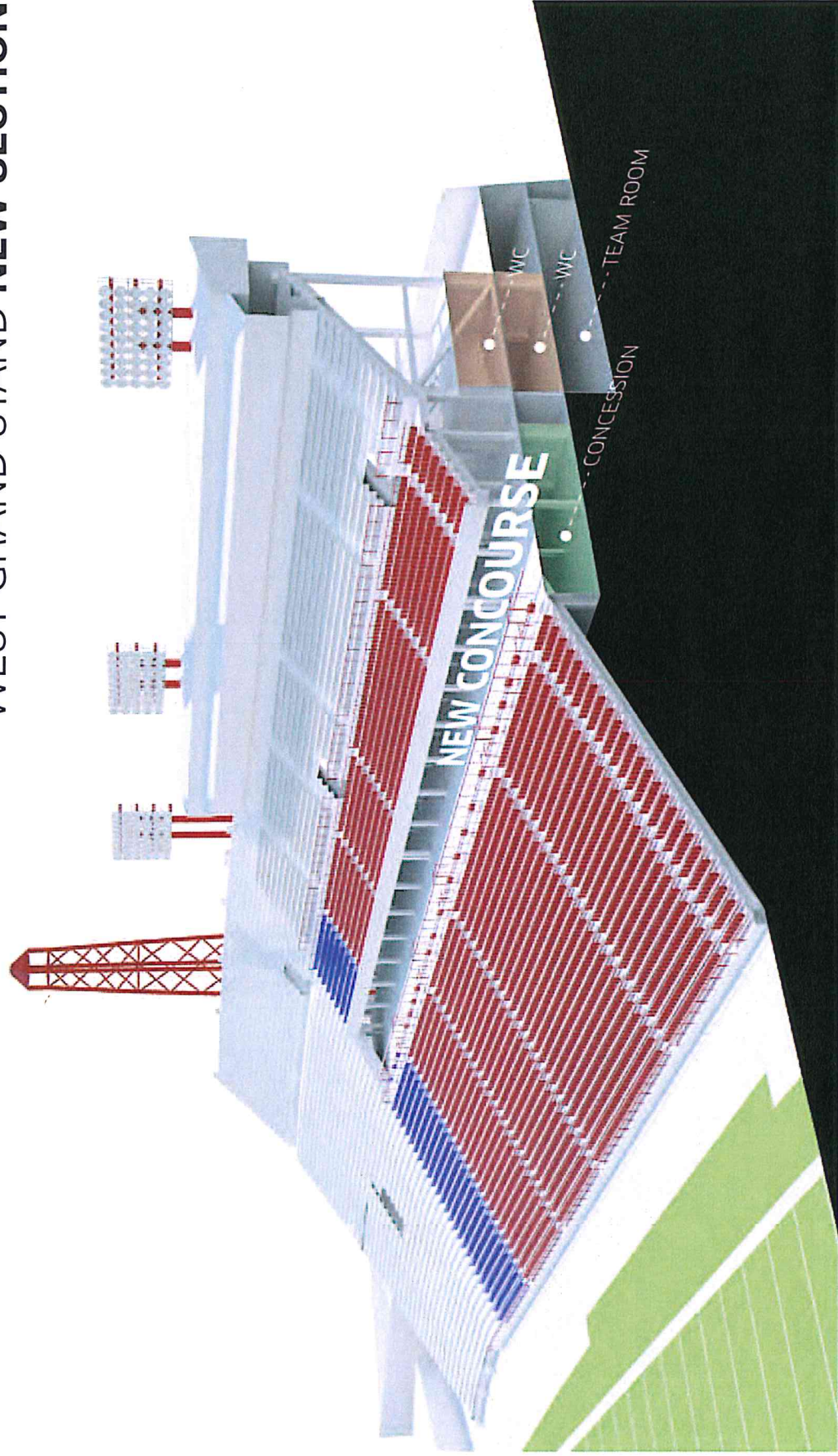
WEST GRAND STAND LOWER LEVEL



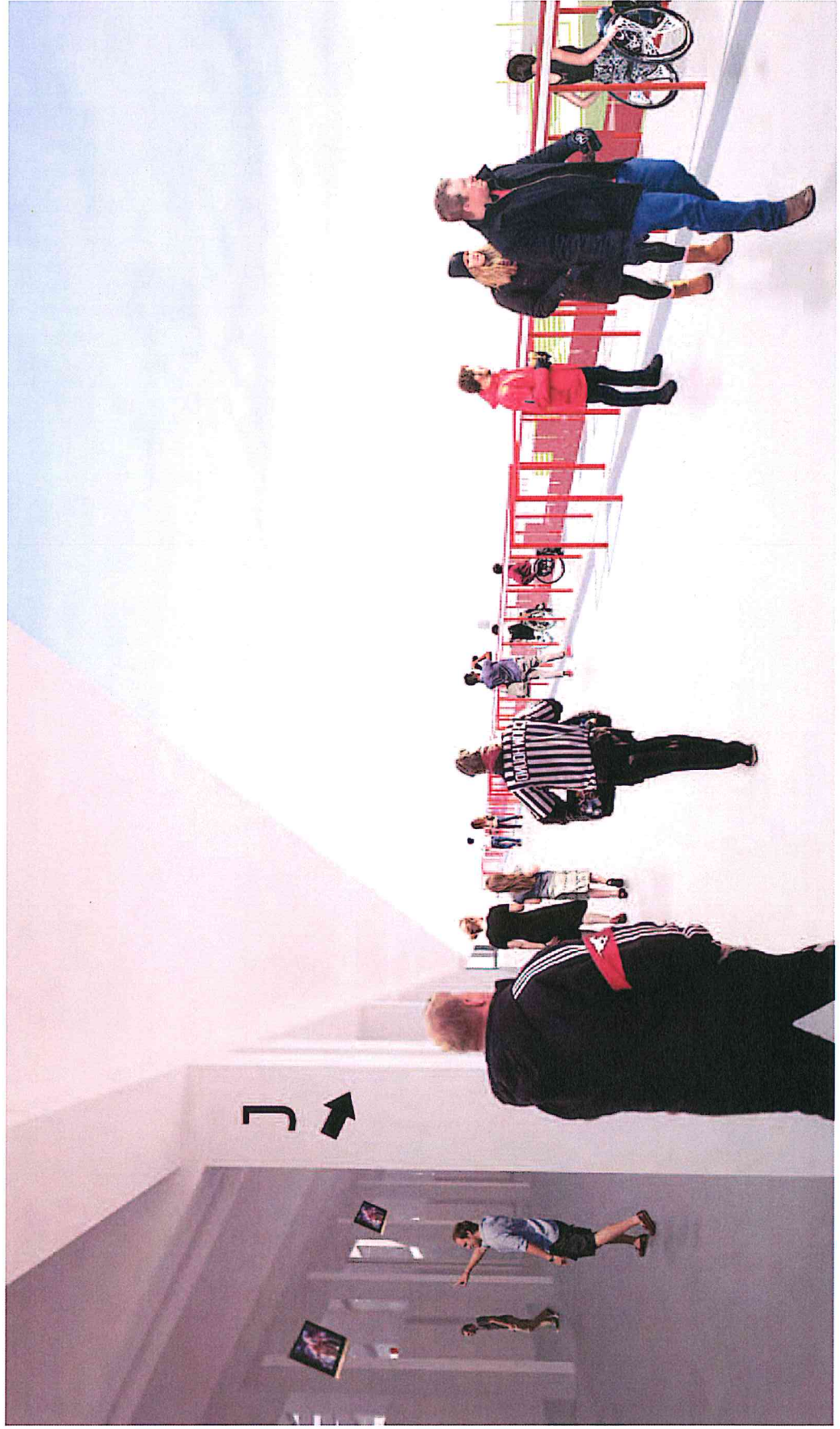
WEST GRAND STAND CONCOURSE LEVEL



WEST GRAND STAND **NEW SECTION**



WEST GRAND STAND **NEW ACCESSIBLE SEATING AT CONCOURSE LEVEL**



NEW FAN ZONE



ELEMENTAL COST SUMMARY

Class D Estimate (+/- 30% Accuracy)

Calgary, AB



Project: McMahon Stadium Architectural Renovations - Option 1 = Vision, Part 1

Location: Calgary, AB

Owner/Client: McMahon Stadium Society

Architect: Dialog

Cat:

File: DC-1

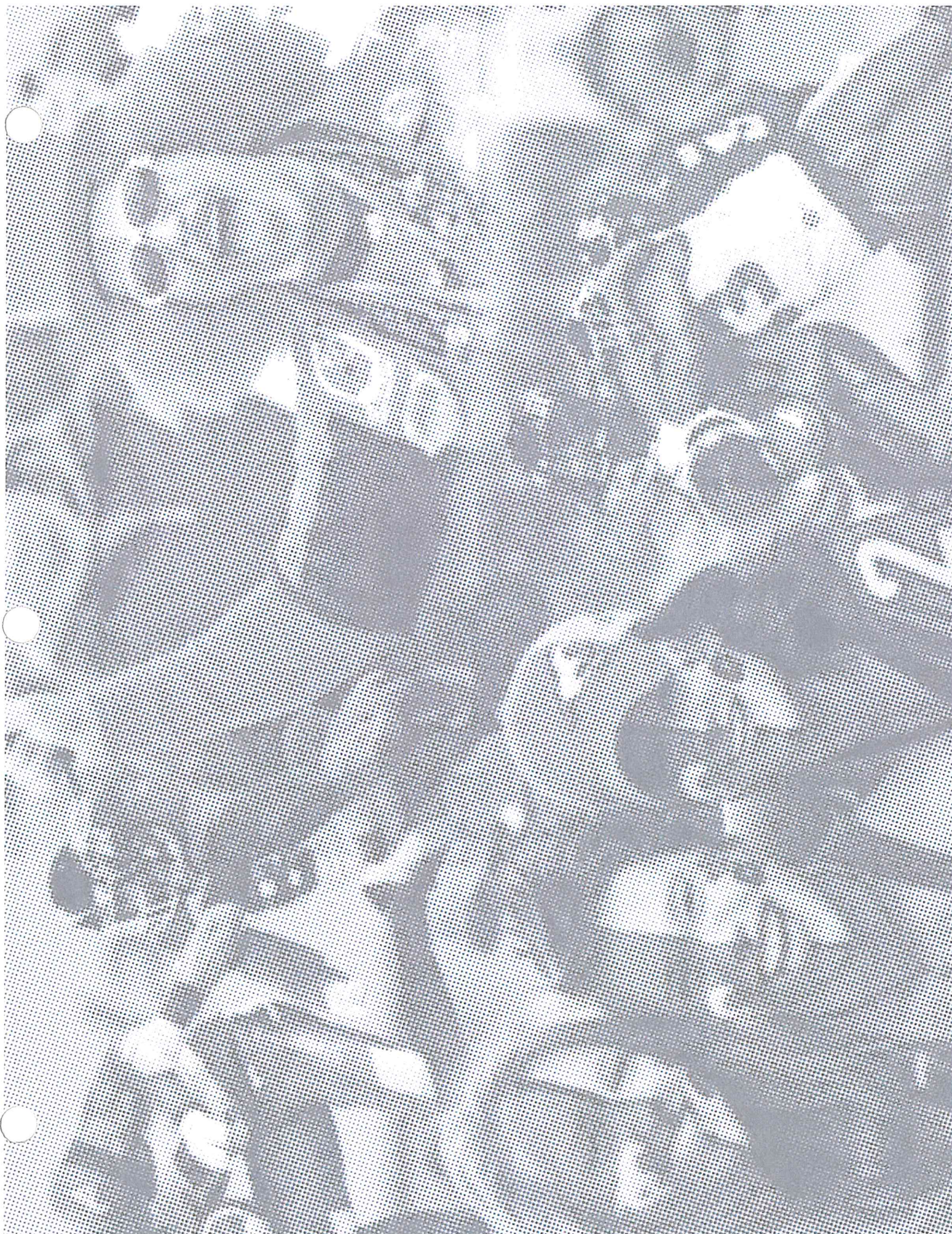
Date: 9-Dec-16

Project Number: P8522

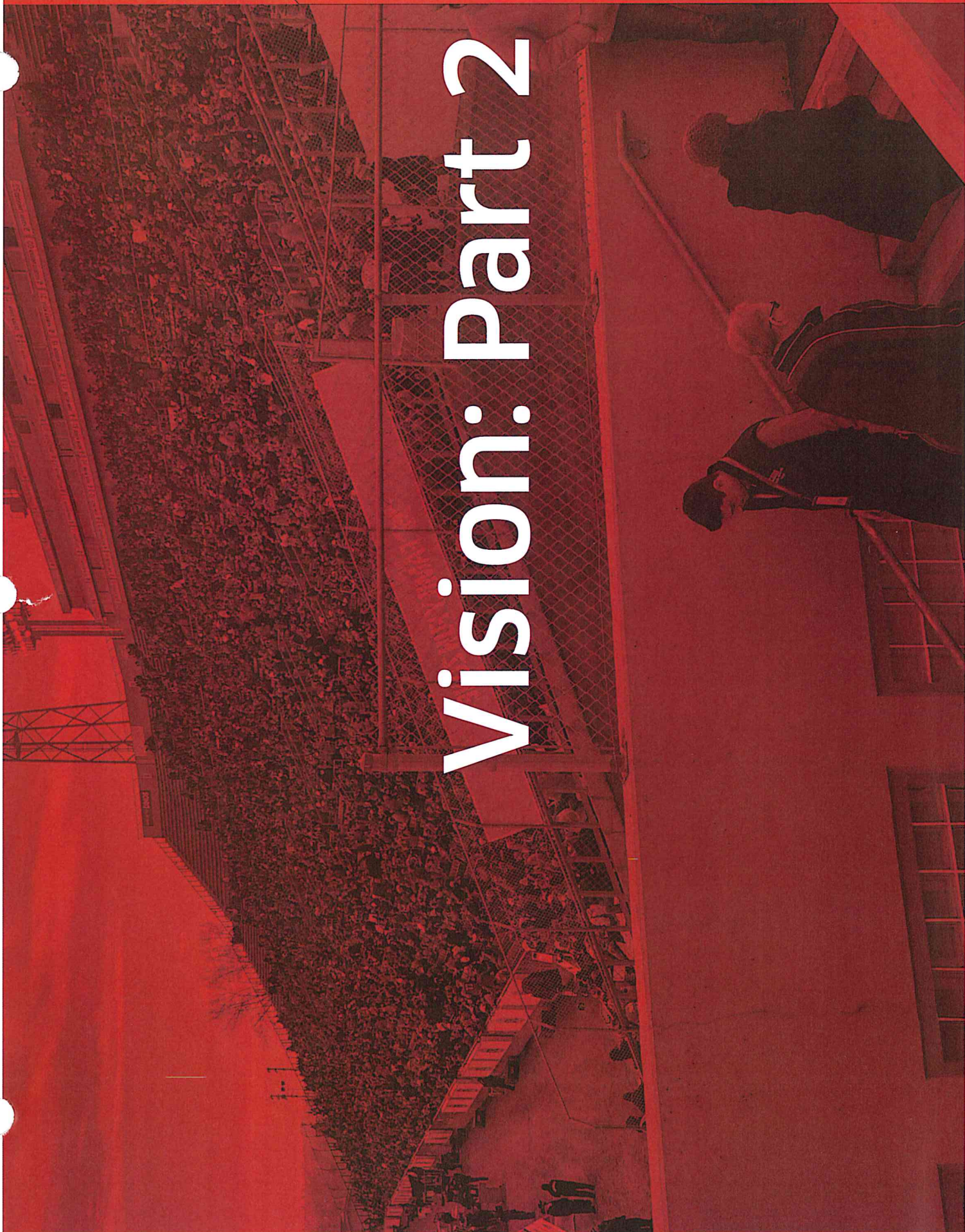
Gross Site Area (GSA): 17,000 m2

Element	Ratio to GFA	Elemental Quantity	Elemental Unit Rate	Elemental Amount	Cost/m2	Amount	
A SHELL							
A1 SUBSTRUCTURE							
A11 Foundation	0.16	2,640 m2	\$150.00	\$396,000	\$23.29		
A12 Basement Excavation	0.00	0 m3	\$0.00	\$0	\$23.29	\$396,000	2%
A2 STRUCTURE							
A21 Lowest Floor Construction	0.08	1,398 m2	\$40.00	\$55,920	\$185.97		
A22 Upper Floor Construction	0.22	3,810 m2	\$815.12	\$3,105,607	\$182.68		
A23 Roof Construction	0.00	0 m2	\$0.00	\$0	\$0.00	\$3,161,527	14%
A3 EXTERIOR ENCLOSURE							
A31 Walls Below Grade	0.00	0 m2	\$0.00	\$0	\$19.00		
A32 Walls Above Grade	0.00	0 m2	\$0.00	\$0	\$0.00		
A33 Windows & Entrances	0.00	0 m2	\$0.00	\$0	\$0.00		
A34 Roof Covering	0.00	0 m2	\$0.00	\$0	\$0.00		
A35 Projections	0.01	252 m2	\$1,281.75	\$323,000	\$19.00	\$323,000	1%
B INTERIORS							
B1 PARTITIONS & DOORS							
B11 Partitions	Included in element D23 Alterations				\$0.00		
B12 Doors	Included in element D23 Alterations				\$0.00	\$0	0%
B2 FINISHES							
B21 Floor Finishes	Included in element D23 Alterations				\$0.00		
B22 Ceiling Finishes	Included in element D23 Alterations				\$0.00		
B23 Wall Finishes	Included in element D23 Alterations				\$0.00	\$0	0%
B3 FITTINGS & EQUIPMENT							
B31 Fittings & Fixtures	1.00	17,000 m2	\$122.21	\$2,077,570	\$122.21		
B32 Equipment	Included in element D23 Alterations			\$0	\$0.00		
B33 Conveying Systems	0	0 stp	\$0.00		\$0.00	\$2,077,570	9%

C SERVICES									
C1 MECHANICAL									
C11 Plumbing & Drainage									
C12 Fire Protection									
C13 H.V.A.C.									
C14 Controls									
C2 ELECTRICAL									
C21 Service & Distribution									
C22 Lighting, Devices & Heating									
C23 Systems & Ancillaries									
NET BUILDING COST (Excluding Site)									
D SITE & ANCILLARY WORK									
D1 SITE WORK									
D11 Site Development									
D12 Mechanical Site Services									
D13 Electrical Site Services									
D2 ANCILLARY WORK									
D21 Demolition									
D22 Hazardous Waste Removal									
D23 Alterations									
NET BUILDING COST (Including Site)									
Z GENERAL REQUIREMENTS & ALLOWANCES									
Z1 GEN. REQ. & FEE									
Z10 Phasing Allowance									
Z11 General Requirements									
Z12 Fee									
TOTAL CONSTRUCTION ESTIMATE (Excluding Allowances)									
Z2 ALLOWANCES									
Z21 Design & Pricing Contingency									
Z22 Escalation Allowance									
Z23 Construction (Change Order) Allowance									
TOTAL CONSTRUCTION ESTIMATE (Including Allowances)									
GOOD & SERVICES TAX									
TOTAL CONSTRUCTION ESTIMATE (Including Allowances)									
GSA									
GSA									



Vision: Part 2



PART 2



CBEC Study – McMahon Stadium Calgary, Alberta

Class 5 Cost Estimate (R2)

Prepared for:
DIALOG
300, 134 - 11th Avenue SE
Calgary, AB, T2G 0X5
Phone: 403.245.5501

Prepared by:
ALTUS GROUP LIMITED
Suite 310, 2020-4th Street SW
Calgary, Alberta T2S 1W3
Phone: 403.508.7770
Fax: 403.228.1020

Issued: March 17, 2017
Revised (R1): March 24, 2017
Revised (R2): March 24, 2017
Job No.: 13130.100500.007

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March 24, 2017

Job No. 13130.100500.007

Dialog
300, 134 - 11th Avenue SE
Calgary, AB T2G 0X5
Phone: 403.245.5501

Attention: Mr. Douglas Cinnamon, Architect, AAA, AIBC, Principal

Re: CBEC Study – McMahon Stadium, Calgary, AB - Class 5 Cost Estimate (R2)

Dear Douglas,

We submit for your review our Class 5 Estimate (R2), in accordance with the terms of our engagement.

The estimate includes all direct and indirect construction costs, subject to certain exclusions, and general conditions, as well as, contractor's overheads and profit. The estimate also addresses the following contingencies and allowance values.

- A design and pricing contingency has been **included** in the estimate.
- Escalation allowance of construction has been **excluded** in the estimate.
- Construction (change order) allowance has been **included** in the estimate.
- An allowance for "soft costs" has been **included** in the estimate.

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Should you have any questions related to this report please do not hesitate to contact the undersigned at the address listed below.

Yours truly,

ALTUS GROUP LIMITED



Per: Ven R Guerra, MRICS, PQS
Senior Cost Consultant



Per: David Crane, MRICS, PQS
Senior Director

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Appendices

Appendix A – Budget Allocation Summary

Appendix B – Drawings / Documents List

1 Introduction

1.1 General Information

This Class 5 cost estimate is intended to provide a realistic budget of the expansion and/or renovation of the existing 35,400-seat stadium in order to accommodate the opening and closing ceremonies for the proposed Calgary bid on the 2026 Winter Olympics. The estimate reflects our opinion as to the fair market value for the construction of this proposed project and is not intended to predict the lowest bid.

The details outlining inclusions and assumptions are described within section 6 of this report. This report includes all direct and indirect construction costs with the following exclusions as noted in section 1.2 below.

1.2 Exclusions

The following items are excluded in this report:

- Land acquisition, survey and associated costs
- Financing cost
- Phased construction
- Soil remediation and/or removal
- Any work associated with asbestos removal and maintained of contaminated asbestos work area, if required
- Upgrade / renovation works of existing areas other than those identified in the design information
- Offsite work outside proposed site area
- Any scope, program and overlay requirements outside of Dialog's identified scope
- Escalation allowance
- Goods & Services Tax (GST)
- Additional elevator(s) or works to existing
- Big Air
- Façade to exposed back of temporary tiered seating
- Temporary washrooms
- New AV & Clock System
- Site services to temporary bus staging area, part of overlay budget
- Emergency generator
- Site services upgrade to Options 1 & 2

1.3 Estimate Accuracy

This Class 5 estimate was prepared based on ongoing studies with an expected accuracy range of -50% to +100%, as per the City of Calgary Corporate Project Management Framework Estimation and Contingency Standard V1.2 document.

2 Project Details

2.1 General Information

From the information provided in appendix A, we have measured quantities where possible and applied unit rates considered competitive for a project of this nature, based on historical and current cost data for this type of project. Where design information was limited, we have had discussions with the relevant design disciplines and/or made assumptions based on our experience with projects of a similar type, size, and standard of quality.

2.2 Location

The location cost base for this estimate is the Calgary, Alberta.

2.3 Measurement and Pricing

The estimate has been prepared using generally accepted principles as to format, method of measurement and pricing. Quantities and project statistics have been calculated in general accordance with the Canadian Institute of Quantity Surveyors' Method of Measurement.

The unit rates within our report are considered competitive and are based on our experience with similar projects, and/or quotes provided by subcontractors as noted. Pricing shown reflects probable construction costs obtainable in Calgary, Alberta, on Q1, 2017. Where applicable, unit rates include labour, material, equipment, and subcontractor's overheads and profit. In instances where design information was limited, we have made reasonable assumptions based on our experience on projects of a similar nature and discussions with the design team when possible.

2.4 Taxes

The estimate excludes the Goods and Services Tax (GST).

2.5 General Requirements and Fees

The General Requirements and Fee included within the estimate for the General Contractor are calculated as a percentage of the hard costs. The General Requirements are based on our assumptions of the anticipated construction approach and construction schedule for the project. The general requirements percentage includes the cost associated with bonding and insurance. Development and building permit fees are included within the soft cost allowance.

2 Project Details (continued)

2.6 Procurement Methodology

We have assumed that the project will be procured with a Stipulated Lump Sum approach under a CCDC 2 standard form of contract. We have assumed a minimum of five General Contractor bids and at least three major subtrade/supplier bids received for all trade categories to establish competitive bidding and tender results. The estimate is a determination of fair market pricing and not a prediction of lowest bid in any trade category. Please note that should the above minimum bidding conditions not occur on this project, construction bids received could vary significantly from the estimated costs included within this report.

2.7 Schedule / Phasing

This report is based on the project being completed and/or bid as one complete project. The rates used in this report are based on current dollars and any allowance for escalation beyond the date of this report will be included as an escalation contingency. The unit rates in our estimate are based on construction activities occurring during standard business working hours and proceeding within a non-accelerated schedule.

3 Contingencies

3.1 General

The effective use of contingencies in construction cost planning requires a clear understanding of estimating risks in both a project specific and general construction market sense. The appropriate level of contingency is dependent on the amount of information available, knowledge of the design teams' methods and philosophy, the timing of the estimate preparation relative to the project design and construction schedule, and the anticipated complexity of the construction work.

3.2 Design and Pricing

A 10% design and pricing contingency has been included in the hard cost estimate. This contingency covers the design & pricing evolution during the remain design stages of the project, please note this contingency is not intended to cover additional scope or additional functional program requirements.

3.3 Escalation

Escalation allowance has been excluded from this estimate. We recommend that the client carry a separate allowance for this item in their overall project budget.

3.4 Construction Contingency (Post Contract)

A 5% construction contingency has been included in the hard cost estimate. The intention of this contingency is to cover post contract change orders.

3.5 Soft Cost Allowance

A 23% soft cost allowance has been included in this estimate as a percentage of the hard construction cost. This include design fee (12%), cost consultancy/independent certifier (0.4%), city administration/PM fees (3%), legal fees (0.5%), permits (1.1%), third party material testing (1%), moveable FF&E (2%) and program contingency (3%).

4 General Statement of Liability

4.1 Probable Costs and Ongoing Cost Control

Altus Group Limited does not guarantee that tenders or actual construction costs will not vary from this estimate. Acute market conditions, proprietary specifications, or competition/collaboration among contractors may cause tenders to vary from reasonable estimates based on normal and abnormal competitive conditions.

Altus Group Limited recommends the owner and/or design team review the cost estimate report including line item descriptions, unit prices, allowances, assumptions, exclusions, and contingencies to ensure the appropriate design intent has been accurately captured within the report.

It should be noted that the cost consultants are not qualified to confirm that construction work and design is in accordance with approved plans and specifications.

5 Executive Project Cost Summary

Component	Option 1 40,000 Seats (\$)	Option 2 55,000 Seats (\$)	Option 3 40,000 Seats (\$)	Option 4 55,000 Seats (\$)
A. Hard Construction Cost				
Temporary Works				
Temporary Seating & Field Stage	\$5,758,040	\$9,925,840	\$7,086,640	\$11,726,580
Temporary Bus Staging	\$279,450	\$279,450	\$279,450	\$279,450
Allowance for berm access to north stand	\$2,000,000	\$2,000,000	\$2,000,000	\$2,000,000
Permanent Works				
New Entry Plaza, Ticketing & Fan Zone	N/A	N/A	\$14,545,570	\$14,545,570
New Team Store	N/A	N/A	N/A	N/A
Base Build	N/A	N/A	\$1,826,770	\$1,826,770
Fitout	N/A	N/A	\$1,149,240	\$1,149,240
New Concourse Level	N/A	N/A	N/A	N/A
New Washrooms	N/A	N/A	\$2,982,400	\$2,982,400
Renovated Washrooms	N/A	N/A	\$2,076,960	\$2,076,960
New seats (permanent)	N/A	N/A	\$1,241,700	\$1,241,700
New Food Prep Kitchen	N/A	N/A	\$1,526,170	\$1,526,170
Base Build	N/A	N/A	\$633,240	\$633,240
Fitout	N/A	N/A	\$1,598,180	\$1,598,180
New Concessions	N/A	N/A	N/A	N/A
Base Build	N/A	N/A	\$1,234,710	\$1,234,710
Fitout	N/A	N/A	\$3,134,650	\$3,134,650
New Operations Centre	N/A	N/A	\$2,769,480	\$2,769,480
New Concourse Patio	N/A	N/A	\$1,804,400	\$1,804,400
Net Building Cost	\$8,037,490	\$12,205,290	\$45,889,560	\$50,529,500
Phasing	Excluded	Excluded	Excluded	Excluded
General Requirements	\$804,000	\$1,221,000	\$4,589,000	\$5,053,000
Fees	\$265,000	\$403,000	\$1,515,000	\$1,668,000
Total Construction Cost (Including General Requirements and Fees)	\$9,106,490	\$13,829,290	\$51,993,560	\$57,250,500
Design and Pricing Contingency	\$911,000	\$1,383,000	\$5,199,000	\$5,725,000
Escalation Contingency	Excluded	Excluded	Excluded	Excluded
Construction (Change Order) Contingency	\$501,000	\$761,000	\$2,860,000	\$3,149,000
TOTAL HARD CONSTRUCTION COST (Including Allowances)	\$10,518,490	\$15,973,290	\$60,052,560	\$66,124,500
Hard cost/m2	\$574 /m2	\$654 /m2	\$1,461 /m2	\$1,389 /m2

5 Executive Project Cost Summary

Component	Option 1 40,000 Seats (\$)	Option 2 55,000 Seats (\$)	Option 3 40,000 Seats (\$)	Option 4 55,000 Seats (\$)
B. Soft Cost				
Soft Costs including Movable FF&E	23.0%	\$3,674,000	\$13,812,000	\$15,209,000
TOTAL SOFT COST	\$2,419,000	\$3,674,000	\$13,812,000	\$15,209,000
Soft cost/m2	\$132 /m2	\$150 /m2	\$336 /m2	\$320 /m2
Goods Services Tax (GST)	Excluded	Excluded	Excluded	Excluded
TOTAL PROGRAM COST (HARD & SOFT) (Excluding GST)	\$12,937,490	\$19,647,290	\$73,864,560	\$81,333,500
GFA (m2)	18,324 m2	24,424 m2	41,097 m2	47,597 m2
Rate/m2 (based on Total Project Cost)	\$706.03 /m2	\$804.41 /m2	\$1,797.31 /m2	\$1,708.78 /m2
	- 5,000 temporary seats	- 20,000 temporary seats - relocate scoreboard	- 12,000 temporary seats - 700 new permanent seats - demolish 2,500 seats - concourse alteration - new entry / ticket area - new team store - new concourse patio	- 27,000 temporary seats - 700 new permanent seats - demolish 2,500 seats - concourse alteration - new entry / ticket area - new team store - new concourse patio - relocate scoreboard

Appendix A

Budget Allocation Summary

<u>Component</u>	<u>Revitalization</u>	<u>Estimated Cost \$</u> <u>Legacy Upgrades</u>	<u>Olympic Upgrades</u>	<u>TOTAL</u>
1. Temporary Works				
Temporary seating c/w re-instatement	~	~	1,764,890	1,764,890
Temporary stage c/w re-instatement	~	~	3,993,150	3,993,150
Temporary bus staging c/w re-instatement	~	~	279,450	279,450
Allowance for berm access to north stand	~	~	2,000,000	2,000,000
Sub-total	~	~	8,037,490	8,037,490
2. Permanent Works				
None required	~	~	~	~
Sub-total	~	~	~	~
Sub-total All Components	~	~	8,037,490	8,037,490
General requirements and Fee	~	~	1,069,000	1,069,000
Sub-total	~	~	9,106,490	9,106,490
Design and Pricing Contingency (10%)	~	~	911,000	911,000
Post-contract Contingency (5%)	~	~	501,000	501,000
Escalation (excluded)	~	~	~	~
Construction Total - Excluding G.S.T.	~	~	10,518,490	10,518,490
Soft Costs (23% of construction costs)	~	~	2,419,000	2,419,000
PROJECT TOTAL	~	~	12,937,490	12,937,490

Option Differentiators:

North stand temporary seats @ 5,000no.

<u>Component</u>	<u>Revitalization</u>	<u>Estimated Cost \$</u> <u>Legacy Upgrades</u>	<u>Olympic Upgrades</u>	<u>TOTAL</u>
1. Temporary Works				
Temporary seating c/w re-instatement	~	~	5,932,690	5,932,690
Temporary stage c/w re-instatement	~	~	3,993,150	3,993,150
Temporary bus staging c/w re-instatement	~	~	279,450	279,450
Allowance for berm access to north stand	~	~	2,000,000	2,000,000
Sub-total	~	~	12,205,290	12,205,290
2. Permanent Works				
None required	~	~	~	~
Sub-total	~	~	~	~
Sub-total All Components	~	~	12,205,290	12,205,290
General requirements and Fee	~	~	1,624,000	1,624,000
Sub-total	~	~	13,829,290	13,829,290
Design and Pricing Contingency (10%)	~	~	1,383,000	1,383,000
Post-contract Contingency (5%)	~	~	761,000	761,000
Escalation (excluded)	~	~	~	~
Construction Total - Excluding G.S.T.	~	~	15,973,290	15,973,290
Soft Costs (23% of construction costs)	~	~	3,674,000	3,674,000
PROJECT TOTAL	~	~	19,647,290	19,647,290

Base Option Differentiators:

North stand temporary seats @ 10,000no.
South stand temporary seats @ 10,000no.
Relocation of existing scoreboard
Demolition and reinstatement of southstand paving
March 2017

<u>Component</u>	<u>Estimated Cost \$</u>		<u>TOTAL</u>
	<u>Revitalization</u>	<u>Legacy Upgrades</u> <u>Olympic Upgrades</u>	
1. Temporary Works			
Temporary seating c/w re-instatement	~	~ 3,093,490	3,093,490
Temporary stage c/w re-instatement	~	~ 3,993,150	3,993,150
Temporary bus staging c/w re-instatement	~	~ 279,450	279,450
Allowance for berm access to north stand	~	~ 2,000,000	2,000,000
Sub-total	~	~ 9,366,090	9,366,090
2. Permanent Works			
New Entry Plaza, Ticketing & Fan Zone	14,545,570	~	14,545,570
New Team Store	2,976,010	~	2,976,010
New Concourse Level	2,982,400	~	2,982,400
New Washrooms	2,076,960	~	2,076,960
Renovated Washrooms	1,241,700	~	1,241,700
New Seats (permanent)	1,526,170	~	1,526,170
New Food Prep Kitchen	2,231,420	~	2,231,420
New Concessions	4,369,360	~	4,369,360
New Operations Centre	2,769,480	~	2,769,480
New Concourse Patio	1,804,400	~	1,804,400
Sub-total	36,523,470	~	36,523,470
Sub-total All Components	36,523,470	~ 9,366,090	45,889,560
General requirements and Fee	4,858,000	~ 1,246,000	6,104,000
Sub-total	41,381,470	~ 10,612,090	51,993,560

CBEC McMahon Stadium Venue - Opening / Closing Ceremony
Class 5 Estimate of Construction Cost (R2)



Design and Pricing Contingency (10%)	~	1,061,000	5,199,000
Post-contract Contingency (5%)	~	584,000	2,860,000
Escalation (excluded)	~	~	~
Construction Total - Excluding G.S.T.	~	12,257,090	60,052,560
Soft Costs (23% of construction costs)	~	2,819,000	13,812,000
PROJECT TOTAL	~	15,076,090	73,864,560

Base Option Differentiators:

North stand temporary seats @ 12,000no.
Renovation / alteration works to existing concourse
New entry & ticketing area
New team store
New concourse patio
Demolition of existing 2,500no. tiered seats
New permanent seats @ 700no.

<u>Component</u>	<u>Estimated Cost \$</u>		<u>TOTAL</u>
	<u>Revitalization</u>	<u>Legacy Upgrades</u> <u>Olympic Upgrades</u>	
1. Temporary Works			
Temporary seating c/w re-instatement	~	7,733,430	7,733,430
Temporary stage c/w re-instatement	~	3,993,150	3,993,150
Temporary bus staging c/w re-instatement	~	279,450	279,450
Allowance for berm access to north stand	~	2,000,000	2,000,000
Sub-total	~	14,006,030	14,006,030
2. Permanent Works			
New Entry Plaza, Ticketing & Fan Zone	14,545,570	~	14,545,570
New Team Store	2,976,010	~	2,976,010
New Concourse Level	2,982,400	~	2,982,400
New Washrooms	2,076,960	~	2,076,960
Renovated Washrooms	1,241,700	~	1,241,700
New Seats (permanent)	1,526,170	~	1,526,170
New Food Prep Kitchen	2,231,420	~	2,231,420
New Concessions	4,369,360	~	4,369,360
New Operations Centre	2,769,480	~	2,769,480
New Concourse Patio	1,804,400	~	1,804,400
Sub-total	36,523,470	~	36,523,470
Sub-total All Components	36,523,470	~ 14,006,030	50,529,500
General requirements and Fee	4,858,000	~ 1,863,000	6,721,000
Sub-total	41,381,470	~ 15,869,030	57,250,500

CBEC McMahon Stadium Venue - Opening / Closing Ceremony
Class 5 Estimate of Construction Cost (R2)



Design and Pricing Contingency (10%)	~	1,587,000	5,725,000
Post-contract Contingency (5%)	~	873,000	3,149,000
Escalation (excluded)	~	~	~
Construction Total - Excluding G.S.T.	~	18,329,030	66,124,500
Soft Costs (23% of construction costs)	~	4,216,000	15,209,000
PROJECT TOTAL	~	22,545,030	81,333,500

Base Option Differentiators:

North stand temporary seats @ 12,000no.
 North stand temporary seats @ 15,000no.
 Renovation / alteration works to existing concourse
 New entry & ticketing area
 New team store
 New concourse patio
 Relocation of existing scoreboard
 Demolition of existing 2,500no. tiered seats
 New permanent seats @ 700no.
 Demolition and reinstatement of southstand paving

Appendix B

Drawings / Documents List

Appendix B - Drawings / Documents List

Design Information			
Provided By: Dialog			
Number	Name	Date Issued	Date Received
1.	CBEC Study McMahon Stadium (for costing purposes)	March 9, 2017	March 9, 2017
2.	Bus staging plan	March 13, 2017	March 13, 2017
3.	Various correspondence / emails	March 9 - 13, 2017.	

SUMMARY

EAST GRANDSTAND | NEW FIELD

New concourse level

Open new concourse level to the field of play

New washrooms and renovated washrooms

New accessible and companion seating

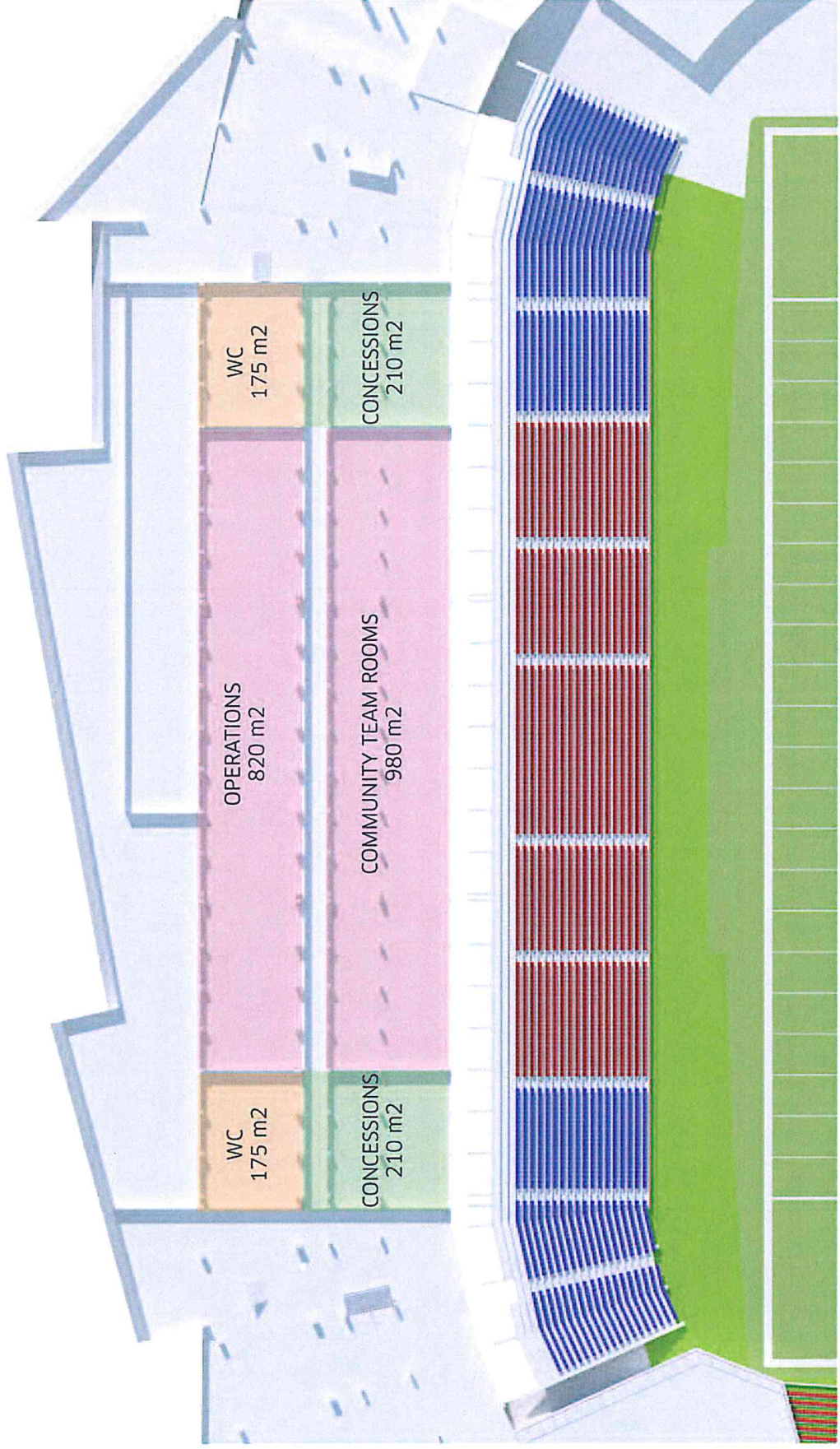
New wayfinding

New stadium seats for the lower bowl

New field surface

All accomplished in 8 months

EAST GRAND STAND LOWER LEVEL



Architectural rendering of a stadium seating chart. The chart shows a large stadium with seating areas in blue and red. A central section of seats is marked with a dashed red line and labeled "NEW CONCOURSE - 1670 M2". To the left of this section are three rectangular areas labeled "WC 245 m2", "CONCESSIONS 345 M2", and "WC 245 m2". Below the dashed red line, a section of seats is marked with a dashed red line and labeled "SECTION OF SEATS REMOVED TO CREATE CONCOURSE OPEN TO FIELD". The chart also shows various other seating areas and sections, including "HC" (Home Club) and "HC" (Home Club) labels.

SECTION OF SEATS REMOVED TO CREATE CONCOURSE OPEN TO FIELD

WC
245 m2

CH

CONCESSIONS
345 M2

ELEMENTAL COST SUMMARY

Class D Estimate (+/- 30% Accuracy)

Calgary, AB



Project: McMahon Stadium Architectural Renovations - Option 2 = Vision, Part 2

Location: Calgary, AB

Owner/Client: McMahon Stadium Society

Architect: Dialog

Cat:

File: DC-1

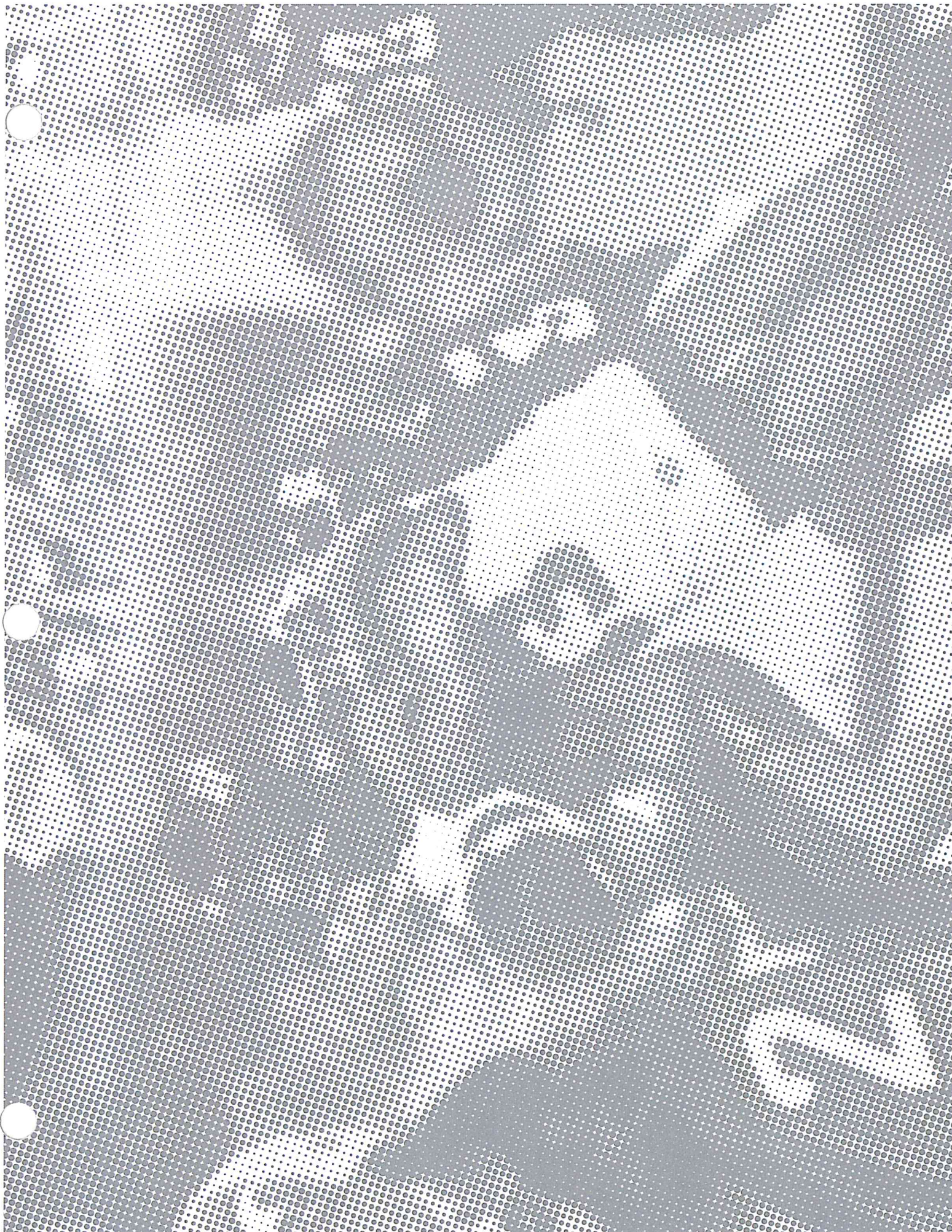
Date: 9-Dec-16

Project Number: P8522

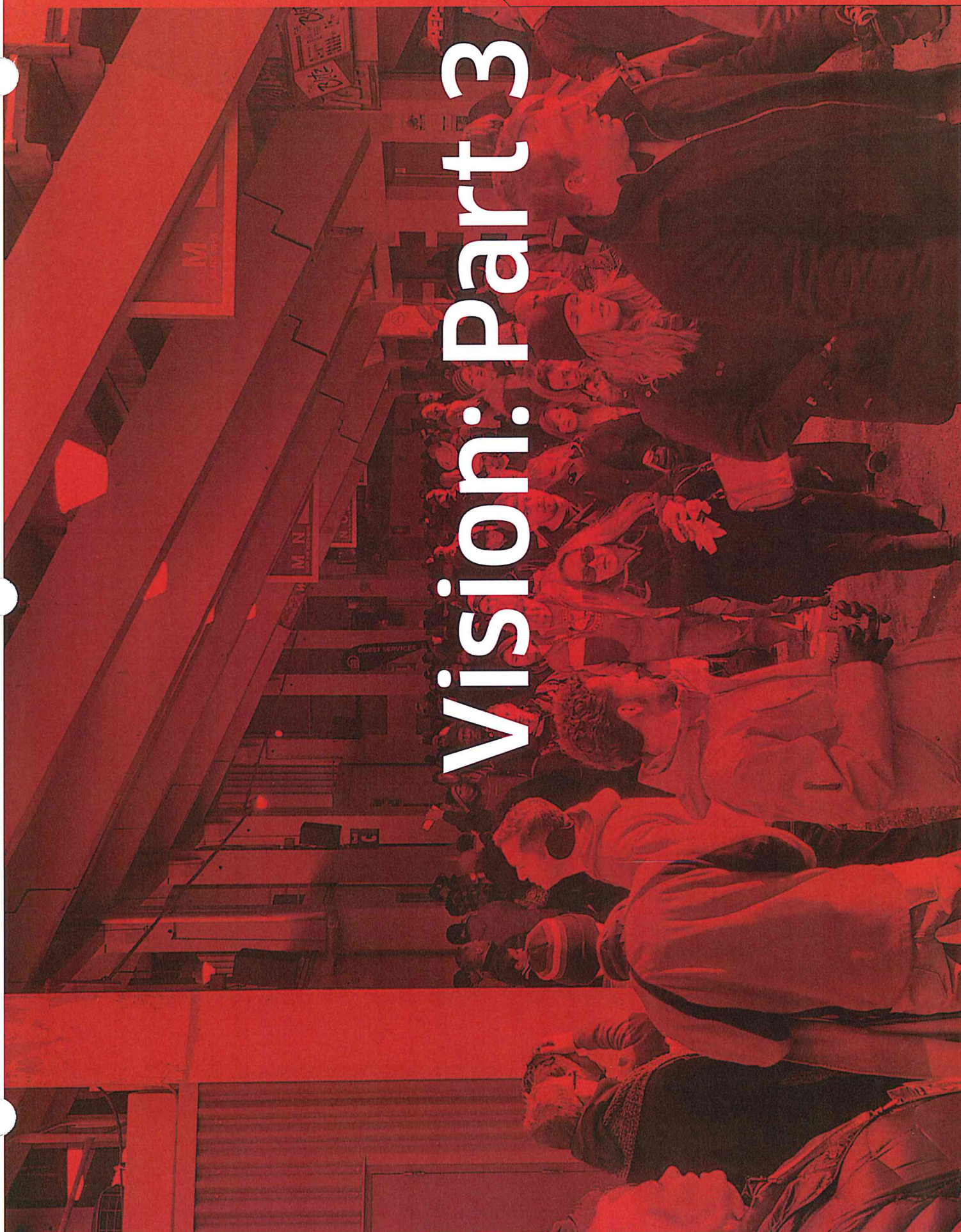
Gross Site Area (GSA): 42,600 m²

Element	Ratio to GFA	Elemental Quantity	Elemental Unit Rate	Elemental Amount	Cost/m ²	Amount	
A SHELL							
A1 SUBSTRUCTURE							
A11 Foundation	0.12	5,280 m ²	\$125.00	\$660,000	\$15.49		
A12 Basement Excavation	0.00	0 m ³	\$0.00	\$0	\$15.49	\$660,000	1%
A2 STRUCTURE							
A21 Lowest Floor Construction	0.07	2,796 m ²	\$40.00	\$111,840	\$148.43		
A22 Upper Floor Construction	0.18	7,620 m ²	\$815.12	\$6,211,214	\$145.80		
A23 Roof Construction	0.00	0 m ²	\$0.00	\$0	\$0.00	\$6,323,054	14%
A3 EXTERIOR ENCLOSURE							
A31 Walls Below Grade	0.00	0 m ²	\$0.00	\$0	\$15.16		
A32 Walls Above Grade	0.00	0 m ²	\$0.00	\$0	\$0.00		
A33 Windows & Entrances	0.00	0 m ²	\$0.00	\$0	\$0.00		
A34 Roof Covering	0.00	0 m ²	\$0.00	\$0	\$0.00		
A35 Projections	0.01	504 m ²	\$1,281.75	\$646,002	\$15.16	\$646,002	1%
B INTERIORS							
B1 PARTITIONS & DOORS							
B11 Partitions	Included in element D23 Alterations				\$0.00		
B12 Doors	Included in element D23 Alterations				\$0.00	\$0	0%
B2 FINISHES							
B21 Floor Finishes	Included in element D23 Alterations				\$0.00		
B22 Ceiling Finishes	Included in element D23 Alterations				\$0.00		
B23 Wall Finishes	Included in element D23 Alterations				\$0.00	\$0	0%
B3 FITTINGS & EQUIPMENT							
B31 Fittings & Fixtures	0.80	34,000 m ²	\$122.21	\$4,155,140	\$97.54		
B32 Equipment	Included in element D23 Alterations				\$97.54		
B33 Conveying Systems	0	0 stp	\$0.00	\$0	\$0.00	\$4,155,140	9%

C SERVICES									
C1 MECHANICAL									
C11 Plumbing & Drainage				Included in element D23 Alterations			\$0.00		
C12 Fire Protection				Included in element D23 Alterations			\$0.00		
C13 H.V.A.C.				Included in element D23 Alterations			\$0.00		
C14 Controls				Included in element D23 Alterations			\$0.00	\$0	0%
C2 ELECTRICAL									
C21 Service & Distribution				Included in element D23 Alterations			\$0.00		
C22 Lighting, Devices & Heating				Included in element D23 Alterations			\$0.00		
C23 Systems & Ancillaries				Included in element D23 Alterations			\$0.00	\$0	0%
NET BUILDING COST (Excluding Site)							\$276.62	\$11,784,196	26%
D SITE & ANCILLARY WORK									
D1 SITE WORK									
D11 Site Development	0.45	19,064 m2	\$547.96		\$10,446,400		\$258.13		
D12 Mechanical Site Services	0.00	1 Sum	\$300,000.00		\$300,000		\$7.04		
D13 Electrical Site Services	0.00	1 Sum	\$250,000.00		\$250,000		\$5.87	\$10,996,400	24%
D2 ANCILLARY WORK									
D21 Demolition	0.80	34,000 m2	\$61.89		\$2,104,230		\$241.46		
D22 Hazardous Waste Removal	0.09	3,850 m2	\$75.00		\$288,750		\$6.78		
D23 Alterations	0.30	12,856 m2	\$697.34		\$8,965,000		\$210.45	\$11,357,980	25%
NET BUILDING COST (Including Site)							\$801.38	\$34,138,576	
Z GENERAL REQUIREMENTS & ALLOWANCES									
Z1 GEN. REQ. & FEE	14.0%	EXCLUDED			\$0		\$114.12		
Z10 Phasing Allowance	0.0%				\$4,096,629		\$0.00		
Z11 General Requirements	12.0%				\$764,704		\$96.17	\$4,861,333	11%
Z12 Fee	2.0%						\$17.95	\$38,999,909	87%
TOTAL CONSTRUCTION ESTIMATE (Excluding Allowances)									
Z2 ALLOWANCES	15.0%						\$141.90		
Z21 Design & Pricing Contingency	10.0%				\$3,899,991		\$91.55		
Z22 Escalation Allowance	0.0%	INCLUDED			\$0		\$0.00		
Z23 Construction (Change Order) Allowance	5.0%				\$2,144,995		\$50.35	\$6,044,986	13%
TOTAL CONSTRUCTION ESTIMATE (Including Allowances)								\$45,044,895	100%
GOOD & SERVICES TAX								\$0	0%
TOTAL CONSTRUCTION ESTIMATE (Including Allowances)								\$45,044,895	100%
GSA	42,600 m2						Cost/m2		
GSA	458,546 sf						1,057.39		
						98.23			



Vision: Part 3



PART 3

SUMMARY

UPPER TIERS | SUITES | CLUB ROOMS, BROADCAST AND ROOFING SYSTEMS

Our idea is to remove the upper tiers of seating from both the east and west sides of the stadium and build new upper sections on both sides.

Create a new area for 21 suites on the west side and a large club level on the east side.

A new upper seating bowl and concourse would be created;

New press box and broadcast booth would be added on the west;

New LED field lighting;

A roofing system would be designed to provide weather protection to the spectators

A new video screen scoreboard on the south

New seats for the upper seating tiers

Will offer patrons the highest standards of food and beverage services, ideal sightlines of the FOP (meeting or exceeding the minimum C values) and comfortable and spacious spectator seats.

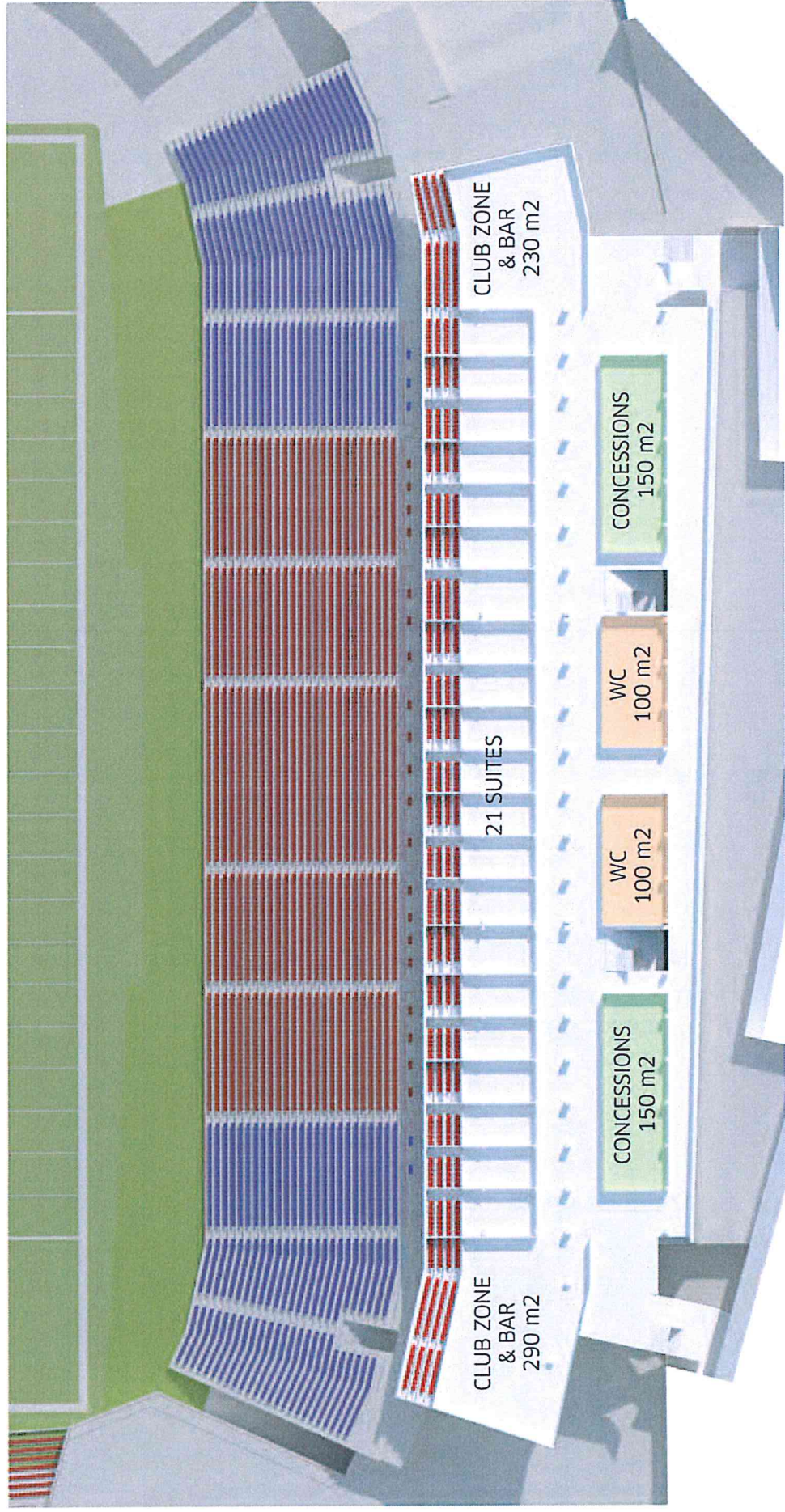
A total of 28,000 seats will be new seating capacity of the stadium

With this vision McMahon Stadium will be prepared to host major international events including the Winter Olympics, GreyCup matches, and FIFA matches.

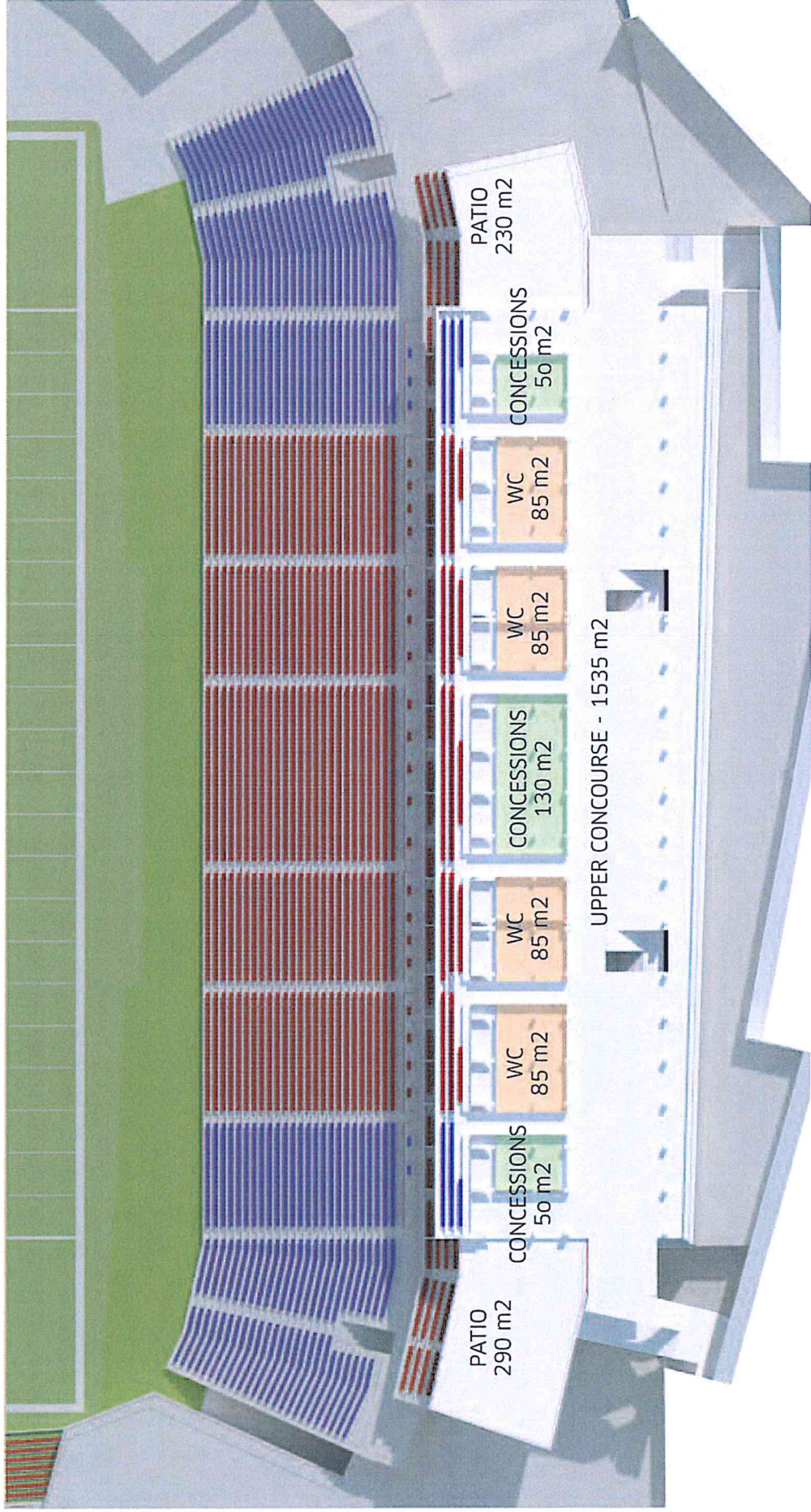
The associated cost estimate for this scope of work is included in the Appendix

Please note that this cost estimate includes Vision: Part 1 and Vision: Part 2. The pricing is cumulative.

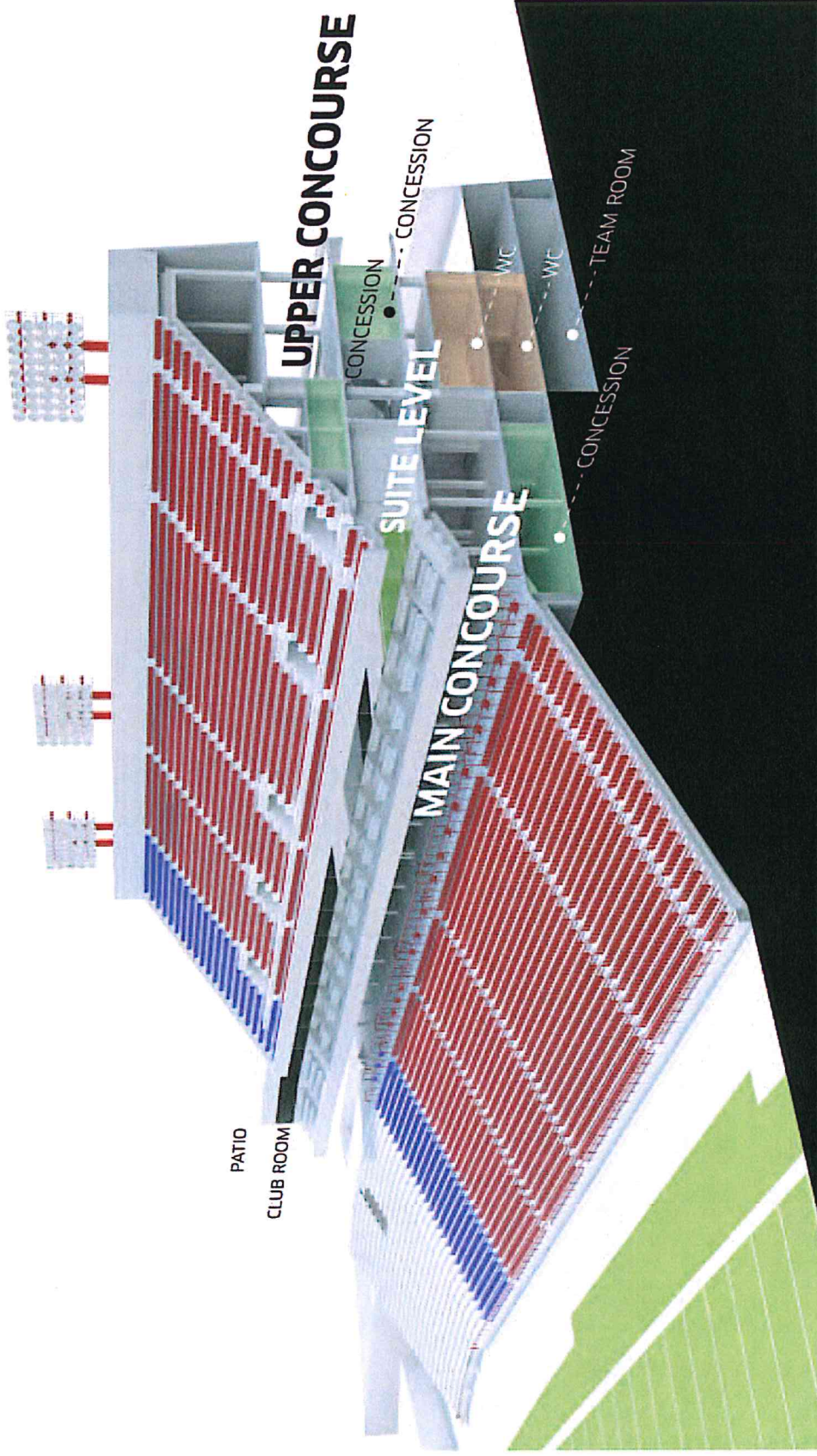
WEST GRAND STAND SUITE LEVEL



WEST GRAND STAND UPPER CONCOURSE



WEST GRAND STAND STADIUM SECTION



WEST GRAND STAND CLUB PATIO



ELEMENTAL COST SUMMARY

Class D Estimate (+/- 30% Accuracy)

Calgary, AB



Cat: DC-1
File: 9-Dec-16
Date: P8522
Project Number: 42,600 m2
Gross Site Area (GSA):

Project: McMahon Stadium Architectural Renovations - Option 3 = Vision, Part 3
Location: Calgary, AB
Owner/Client: McMahon Stadium Society
Architect: Dialog

Element	Ratio to GFA	Elemental Quantity	Elemental Unit Rate	Elemental Amount	Cost/m2	Amount	
A SHELL							
A1 SUBSTRUCTURE							
A11 Foundation	0.12	5,280 m2	\$125.00	\$660,000	\$0.00	\$0.00	0%
A12 Basement Excavation	0.00	0 m3	\$0.00	\$0	\$0.00	\$660,000	0%
A2 STRUCTURE							
A21 Lowest Floor Construction	0.07	2,796 m2	\$40.00	\$111,840	\$0.00	\$0.00	
A22 Upper Floor Construction	0.27	11,420 m2	\$543.89	\$6,211,214	\$0.00	\$0.00	
A23 Roof Construction	0.53	22,600 m2	\$1,870.00	\$42,262,000	\$0.00	\$48,585,054	36%
A3 EXTERIOR ENCLOSURE							
A31 Walls Below Grade	0.00	0 m2	\$0.00	\$0	\$0.00	\$0.00	
A32 Walls Above Grade	0.00	0 m2	\$0.00	\$0	\$0.00	\$0.00	
A33 Windows & Entrances	0.00	0 m2	\$0.00	\$0	\$0.00	\$0.00	
A34 Roof Covering	0.00	0 m2	\$0.00	\$0	\$0.00	\$0.00	
A35 Projections	0.02	1,008 m2	\$1,281.75	\$1,292,004	\$0.00	\$1,292,004	1%
B INTERIORS							
B1 PARTITIONS & DOORS							
B11 Partitions	Included in element D23 Alterations				\$0.00	\$0.00	0%
B12 Doors	Included in element D23 Alterations				\$0.00	\$0	0%
B2 FINISHES							
B21 Floor Finishes	Included in element D23 Alterations				\$0.00	\$0.00	
B22 Ceiling Finishes	Included in element D23 Alterations				\$0.00	\$0.00	
B23 Wall Finishes	Included in element D23 Alterations				\$0.00	\$0	0%
B3 FITTINGS & EQUIPMENT							
B31 Fittings & Fixtures	0.80	34,000 m2	\$197.95	\$6,730,300	\$0.00	\$0.00	
B32 Equipment	Included in element D23 Alterations			\$0	\$0.00	\$0.00	
B33 Conveying Systems	0	0 stp	\$0.00	\$0	\$0.00	\$6,730,300	5%

C SERVICES									
C1 MECHANICAL									
C11 Plumbing & Drainage									
C12 Fire Protection									
C13 H.V.A.C.									
C14 Controls									
C2 ELECTRICAL									
C21 Service & Distribution									
C22 Lighting, Devices & Heating									
C23 Systems & Ancillaries									
NET BUILDING COST (Excluding Site)									
D SITE & ANCILLARY WORK									
D1 SITE WORK									
D11 Site Development									
D12 Mechanical Site Services									
D13 Electrical Site Services									
D2 ANCILLARY WORK									
D21 Demolition									
D22 Hazardous Waste Removal									
D23 Alterations									
NET BUILDING COST (Including Site)									
Z GENERAL REQUIREMENTS & ALLOWANCES									
Z1 GEN. REQ. & FEE									
Z10 Phasing Allowance									
Z11 General Requirements									
Z12 Fee									
TOTAL CONSTRUCTION ESTIMATE (Excluding Allowances)									
Z2 ALLOWANCES									
Z21 Design & Pricing Contingency									
Z22 Escalation Allowance									
Z23 Construction (Change Order) Allowance									
TOTAL CONSTRUCTION ESTIMATE (Including Allowances)									
GOOD & SERVICES TAX									
TOTAL CONSTRUCTION ESTIMATE (Including Allowances)									
GSA									
GSA									

