SPRUCE GROVE CIVIC CENTRE

SCHEMATIC DESIGN REPORT | FINAL

MAY 27, 2022

gec architecture

Acknowledgements & Project Team

Client
City of Spruce Grove

Prime Consultant
GEC Architecture

Structural Consultant
RJC Engineering

Mechanical Consultant
AME Group

Electrical Consultant
SMP Engineering

Refrigeration Consultant
Thermocarb Ltd.

Civil Consultant
Design Works Engineering

Landscape Architect
Design North Landscape Architecture Inc.

Traffic & Parking Assessment
Bunt & Associates

Transportation Engineering
ISL Engineering & Land Services

Cost Consultant*
Costplan Management Ltd.

Construction Manager*
PCL Construction

*Engaged by the city

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1.0 Executive Summary

1.1 Introduction & Project Background

The Civic Centre is envisioned to be an inclusive and welcoming space for all residents of Spruce Grove and the surrounding area. It will merge sports and recreation and culture and community spaces, seamlessly flowing together within one unified facility.

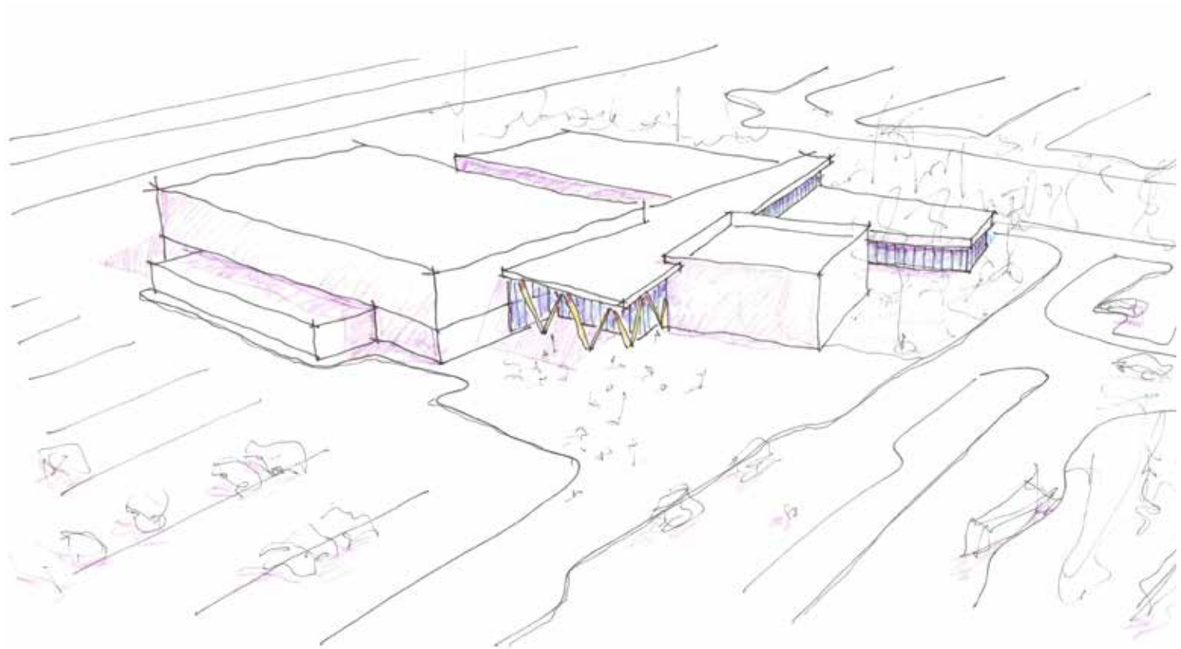
The Civic Centre is being constructed to mitigate the current deficiency of indoor ice within Spruce Grove. The two arenas will be purpose-built ice arenas. The spectator arena will have the added ability to host sporting and community events. The Civic Centre is also expected to mitigate the identified need for cultural spaces. When completed, the Civic Centre will be the largest public building owned by the City of Spruce Grove.

The City of Spruce Grove engaged GEC in July 2021 as the prime the consultant for the design of a new multi-use sports, recreation, and cultural facility. GEC's scope of work for this project also includes the design of the surrounding site and Transit Centre along Westwind Drive.

Until the end of 2021, GEC worked closely with the City of Spruce Grove to develop the building's functional program and site master plan, which included a schematic design for the Transit Centre that was suited to the allocated project budget and realized the goals put forward by city council. This process included coordination of several stakeholder sessions with groups such as the Spruce Grove Public Library, Spruce Grove Allied Arts Council, and Spruce Grove Transit. The 125,000 sq. ft. program for the multi-use facility includes a 1,400 seat spectator arena, 250 seat community arena, black box theatre, library, gallery, and program room. Included within the program is a 5000 sq. ft. specialty dressing and training space that could be suitable for a major tenant. Currently, GEC is completing schematic design for the multi-use facility, including the site planning and Transit Centre.

The new multi-use facility will be built on a greenfield site in the northeast corner of Spruce Grove, south of Highway 16 and east of Century Road. The site will be located directly north of Westwind Drive, once extended further east. The multi-phased construction for the site and building is scheduled to begin in September 2022. Working closely with the pre-construction manager and cost consultant, cost estimates will be delivered to the City of Spruce Grove administration for approval at each project phase, including schematic design.

The project schedule currently anticipates that design development will be completed at the end of June 2022. Once the design development phase is complete and funding is secured by the city, construction documents can move forward. PCL is the pre-construction manager. PCL will be validating the construction cost and schedule during this phase. Cost Plan, the cost consultant will also be producing a cost estimate to validate the construction cost.



HAND SKETCH | AERIAL VIEW

1.2 Guiding Design Principles

Guiding principles are broad, overarching goals for the project. They are qualitative principles intended to temper and inflect detailed program requirements and provide a basis for decision-making.

Visibility of Services

The new Civic Centre will express Spruce Grove's dedication to providing users with an integrated service model by ensuring visibility both externally and internally of the building's functions and services.

Excellence in Universal Design

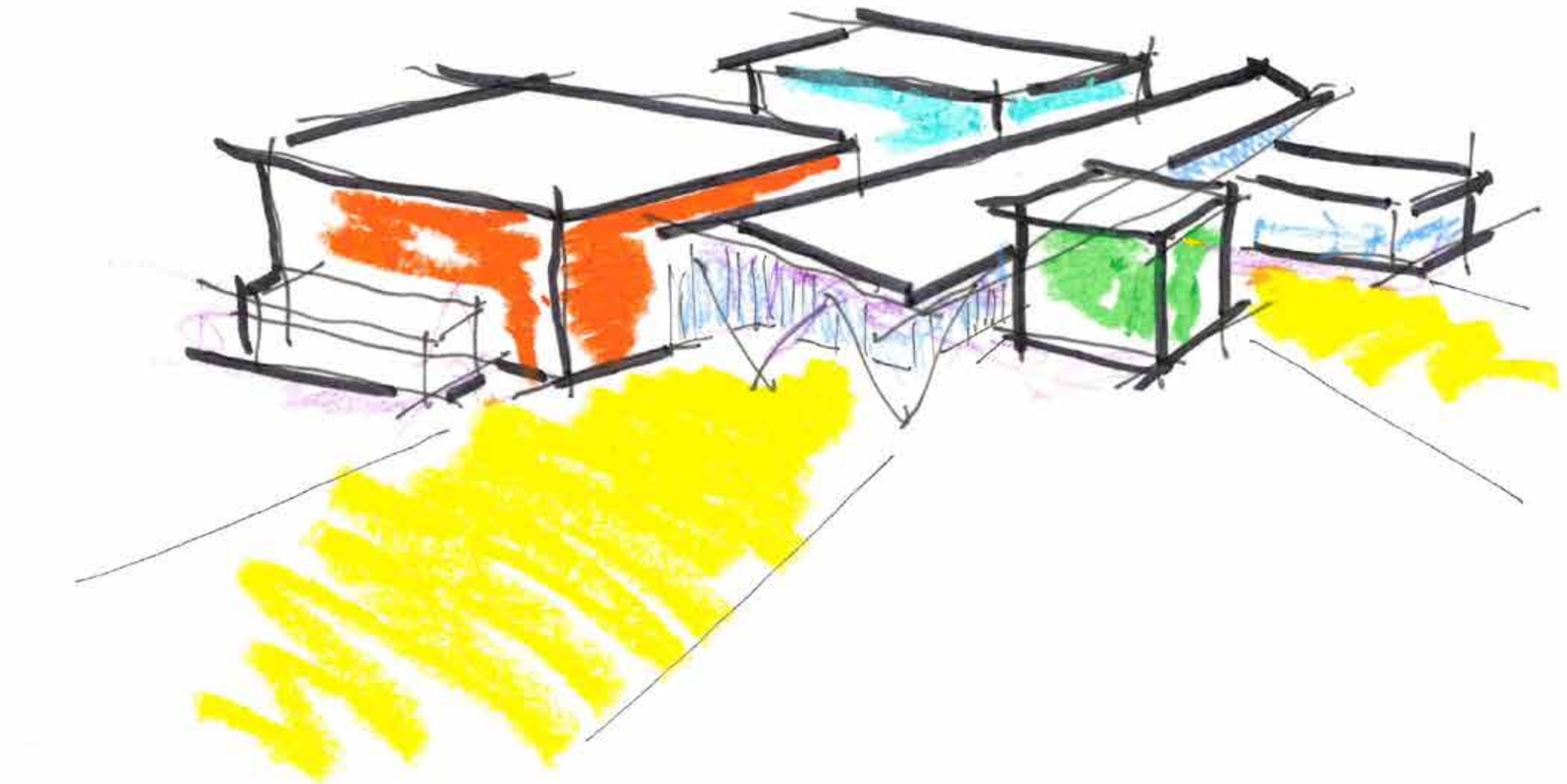
The new Civic Centre will exemplify leadership in universal design in a facility that creates equitable, straight-forward, and intuitive use for all people with diverse needs and abilities.

A Place of Prominence

The new Civic Centre will establish a presence within the fabric of the community that is welcoming and legible to both internal and external users.

An Environment of Inclusivity

The new Civic Centre will create a sense of belonging for all users through safe and inviting spaces that provide a variety of amenities to enhance their experience of the facility.



HAND SKETCH | MASSING

1.3 Schedule & Implementation

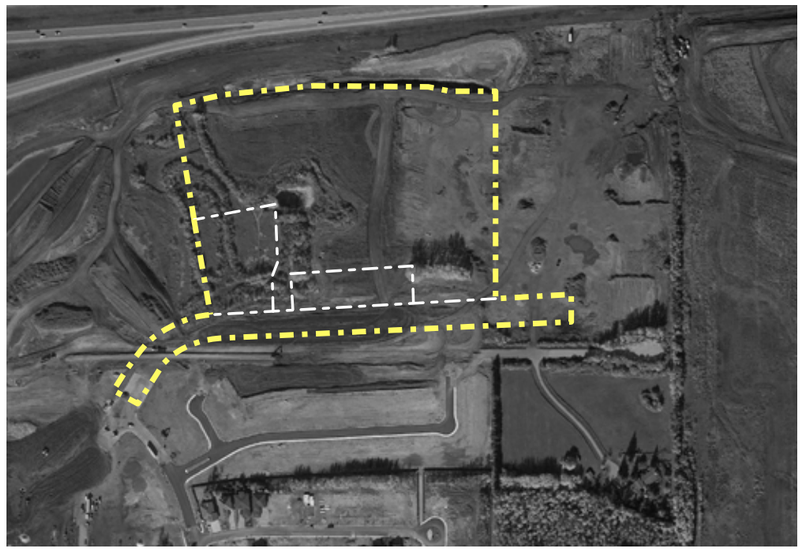
Construction of the new Civic Centre and Transit Centre will occur in two phases, as indicated in the diagrams below.

Phase 1 – The first phase of the project involves site preparation, including the construction of a new road and site access points, installation of site utility services and rough grading. This phase also includes the installation of a dewatering system using french drains and perforated pipes in order to remove water from the site. It is expected that City of Spruce Grove will receive title of the property in September 2022.

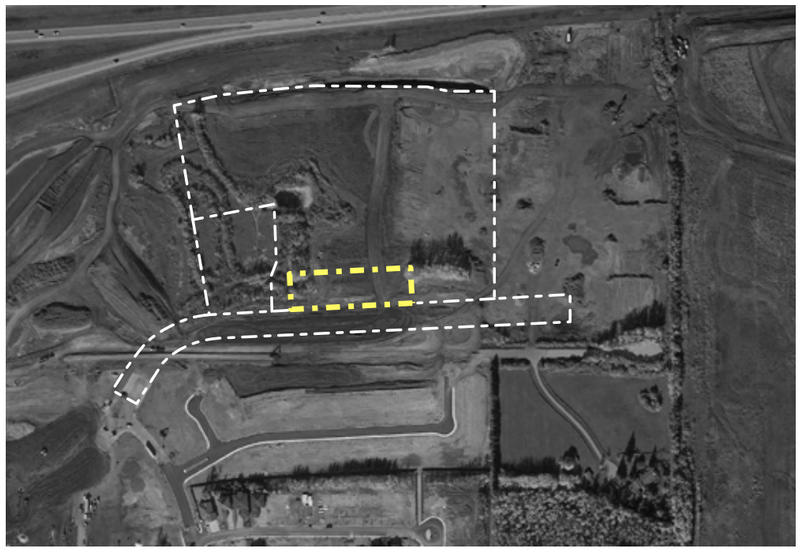
Phase 2 – The second phase involves constructing the Transit Centre, including the surrounding roadway, curbs and sidewalks, universal washrooms and service room, installation of the pre-fabricated heated shelters, and installation of all fixtures and furniture. As part of Phase 1, all services and utilities will be installed for the Transit Centre, including the underground services required for the Civic Centre, which would be below the Transit Centre.

Phase 3 – This phase would involve the complete construction of Civic Centre and surrounding parking lot, including all landscaping.

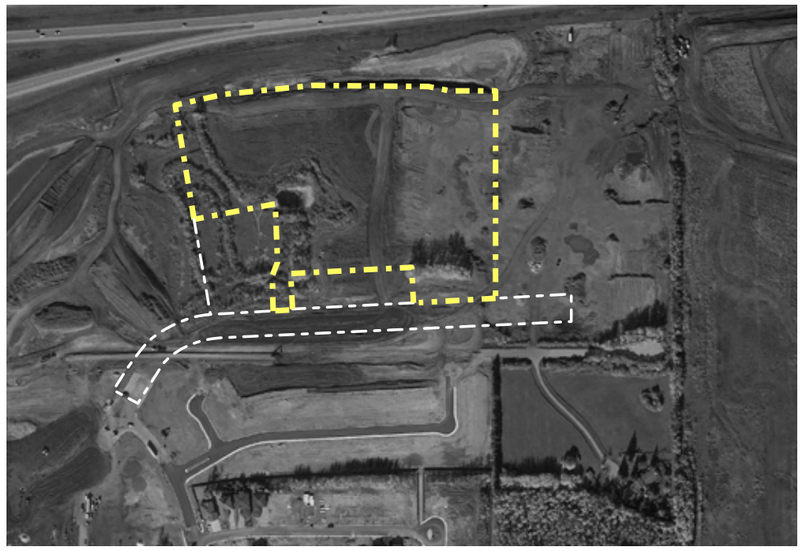
Phase 4 – The last phase will be to develop the remaining parcel within the Civic Centre site. At the current moment it is not known what will be developed on this site and when.



PHASE 1 - SITE PREPARATION & DEVELOPMENT



PHASE 2 - TRANSIT CENTRE CONSTRUCTION

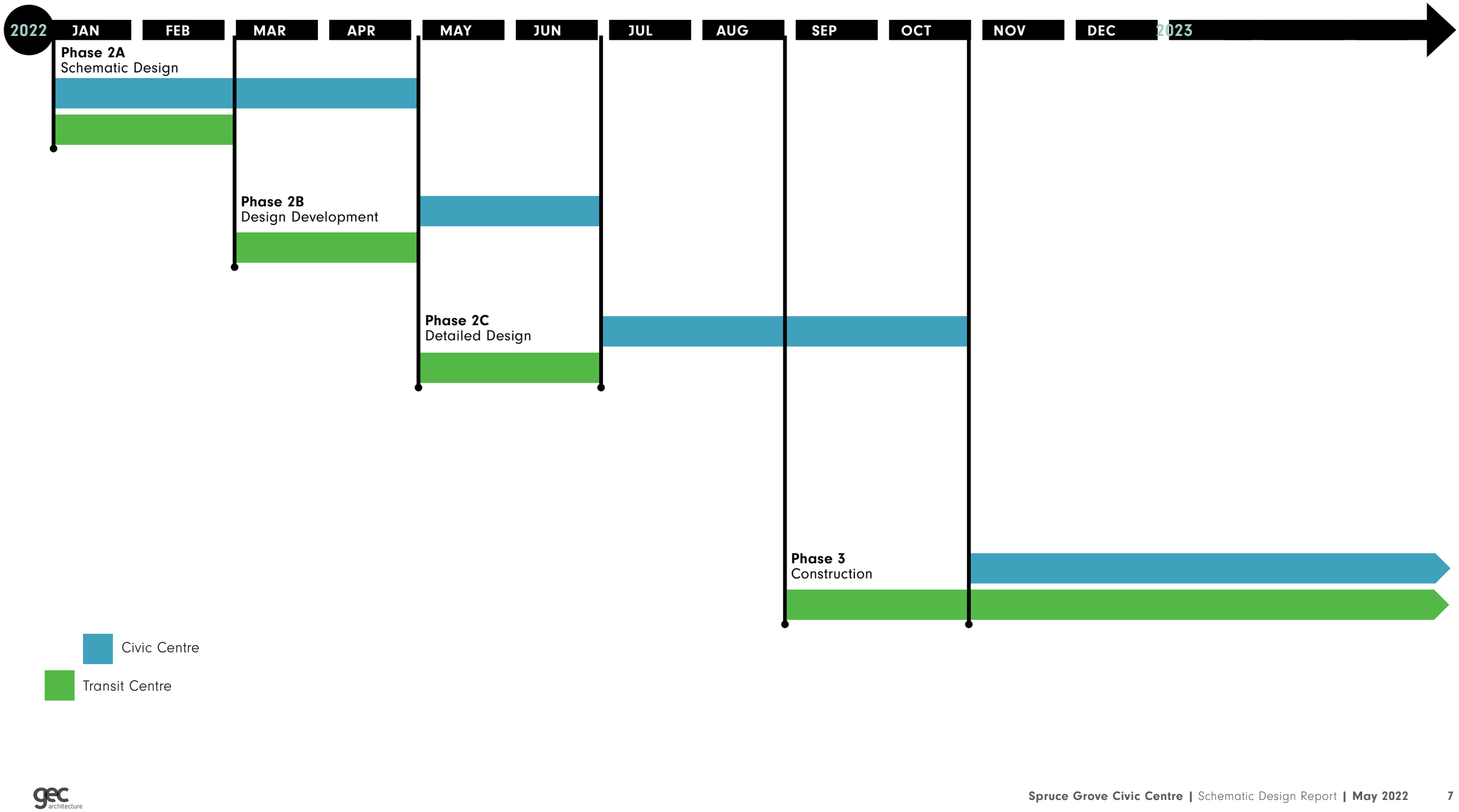


PHASE 3 - CIVIC CENTRE CONSTRUCTION

PHASE 4 - FUTURE SITE DEVELOPMENT

1.0 Executive Summary

1.3 Schedule & Implementation









2.0

FUNCTIONAL PROGRAM



2.0 Functional Program

2.1 Definition and Description

A more detailed breakdown of the program areas and space allocation can be found in Appendix A. The current schematic design anticipates a gross building area of 129,423 ft^2 or 12,024 m^2.

DEFINITION AND DESCRIPTION

The functional programming phase, a pre-design task, is a discipline that involves meeting with owners', users', and stakeholders' for more functionally responsive and accountable buildings. *The general purpose of the functional program is as follows:*

- To provide the approving and funding authorities with a detailed description of the proposed facilities needed prior to initiating architectural design.
- To provide the architectural design team with a clear understanding of the activities to be accommodated and functional criteria to be met during the design process.
- To provide the client/owner with a reference manual for evaluating design schemes as they are generated and for use when commissioning, operating, and evaluating the new facility.

The functional program tables provide the total required area of a component in two ways:

NET AREA

The total net square metres (nsm) reflect the space that directly accommodates an occupant or use. It refers to the area of a functionally assigned space measured to the inside face of the enclosing walls and excluding any interior partitions, structure, internal circulation, or any other unassignable spaces that contribute to the overall component area.

GROSS AREA

The total component gross square metres (gsm) include constituents of gross such as partitions, internal structure, external structure, shafts, and vertical and horizontal circulation. A grossing factor is applied to the net assignable area to determine the component gross area. Component grossing factors differ according to the complexity of space and the number of partitions and circulation paths.

The functional program gross floor areas were determined through the analysis of prescriptive components and their required gross floor areas. The functional programming gross floor areas are part of an ongoing discussion, subject to change, and will be refined with future detailed design.

2.2 User and Stakeholder Input

In developing the functional programs and concept plans for Spruce Grove Civic Centre, dialogue was required with key stakeholders to ensure that specific needs and expectations were clearly understood. In this regard, meetings were held with several stakeholders within the City of Spruce Grove, the Spruce Grove Public Library, arena operations, and the Allied Arts Council.

Indirect consultation was also initiated with sport stakeholders and groups. This consultation has been managed through the City of Spruce Grove. The city has initiated discussion with this group to align the functional programs and concept plans with the approved capital budget.

Further refinement of the functional program will be based on future discussions with users and stakeholders. **Refer to 2.3 Functional Program for detailed information.**

2.3 Program Description

SPECTATOR & COMMUNITY ARENA

The predominant space in the Civic Centre will be the 1,400 seat spectator arena. The spectator arena will be a community amenity utilized by a potential major tenant as well as other ice and community users.

The community arena will also be programmed to offer recreation opportunities to members of the community who are not part of a sports organization. These recreation programs could take the form of public skating, senior skates, and drop-in shinny. A walking track will also be part of the facility, available for all members of the community to utilize when major events are not taking place in the facility.

Both the spectator and community arena should be equipped with the necessary support amenities such as dressing rooms, referee rooms, washrooms, concession, etc. and some amenities will service both arenas. While the on-ice activities could take place on either ice surface, it is the complementary amenities and supports that make the spectator arena suitable for larger sporting events and other community events. Such as seating capacity, audiovisual capabilities, and other aspects that enhance the user experience.

The local minor hockey and ringette associations would use the remaining available ice time in the spectator arena, along with the bulk of the ice time in the community arena. However, ice time would also be available to other community groups, such as the local figure skating club.

An allocation plan will be developed to efficiently utilize the city-operated arenas. When ice is not installed in these arenas, they will be made available for dry floor programming, such as lacrosse and ball hockey.

EVENTS

Although there is a desire to have a facility that may be able to host some events, it's very important to stress we are not building an event centre. Events will be a part of the Civic Centre operation, but will not be the driver. Minor hockey and ringette are also assumed to hold additional tournaments. These tournaments would typically be considered regional or provincial in nature. An opportunity exists for other non-ice users to host sporting events. These would include combative sports, gymnastics, cheer, and court sports. Operationally, we will not remove the ice during the ice season to host an event. If the possibility exists to host an event outside of the ice season, it may be considered.

Community events may take place in parts or all of the Civic Centre. Graduations, Remembrance Day, cultural events, art shows, etc. may also occur. Any community event taking place would have to fit within the parameters of the Civic Centre.

CULTURAL SPACES

The cultural spaces within the Civic Centre will form the heart of the facility. It's in these spaces where the Civic Centre will move from an ice arena to a community facility. The cultural spaces are not intended to replace any existing cultural infrastructure within Spruce Grove, but instead to support and complement the existing investments in cultural spaces.

The different cultural spaces are envisioned to work together, independent of each other, in the provision of exceptional services. For example, the library may run children's programming during hockey tournaments to provide activities for non-participant siblings. Another example might be the black box may be used for a dance practice, a community theatre presentation, an art show, or even a VIP wine and cheese night before an event in the arena or library. Ideally an open space should be provided that is shared between all the cultural spaces.

SPRUCE GROVE PUBLIC LIBRARY

The library will be a satellite location of the Spruce Grove Public Library. The library is operated independently from the city, but is considered a major partner in the Civic Centre. The library spaces will be a mix of uses, with a primary entrance from inside the Civic Centre with a secondary entrance directly outside. Ideally, the space will be open and bright with plenty of windows.

ART GALLERY AND PROGRAM ROOM

The new art gallery within the Civic Centre will be the permanent home location for the Allied Arts Council, a non-for-profit organization. The vision space will include gallery space, program rooms, and spaces for a small reception and retail space. The art gallery can be entered from the Civic Centre but also through a secondary entrance directly from the outdoors. Consideration of glass walls to allow viewing of the art even when the gallery is closed. The ability to properly light art and control exterior light is essential.

BLACK BOX THEATRE

The Black Box Theatre will be a supporting performing arts space. This space will be designed with significant multi-use capabilities. It must be able to function as a performance space for spectators, as a practice space, as a space to host events, and a space to support other activities within the Civic Centre. The Black Box may be used by the community, the city, council, performing arts groups, and others. The Black Box is an essential central space that will make the other cultural and community spaces better.

STAFF SUPPORT SPACES

Staff spaces can be shared between the Spruce Grove Public Library, Allied Arts Council, the Black Box Theatre, and all other building staff. A central staff area with lunchrooms and washrooms would be acceptable.

2.4 Functional Program Summary

The summary of the functional program has been organized into the following five (5) components:

- Spectator arena
- Spruce Grove Saints*
- Community arena
- Cultural space (Black Box Theatre)
- Cultural space (library & art gallery)

The functional program inclusions and exclusions for the selected option are as follows:

INCLUSIONS

- Four (4) dressing rooms for spectator arena
- Four (4) dressing rooms for community arena
- Saints dressing & training room*
- Centralized press box on opposite side of players boxes
- Two concessions in spectator arena only (one on main floor and another on concourse level)
- Library, Art Gallery and Program Room
- 150-person Black Box Theatre, including two (2) dressing rooms, sound room, and theatre office, staging area and storage
- Building support for cultural space included as part of cultural space.
- Ice plant, fluid cooler, generator and mechanical units located outdoors.

EXCLUSIONS

- No viewing suites are included in the spectator arena
- No multi-purpose room is included in the cultural space
- No flex rooms provided between dressing rooms

GROSS FLOOR AREAS

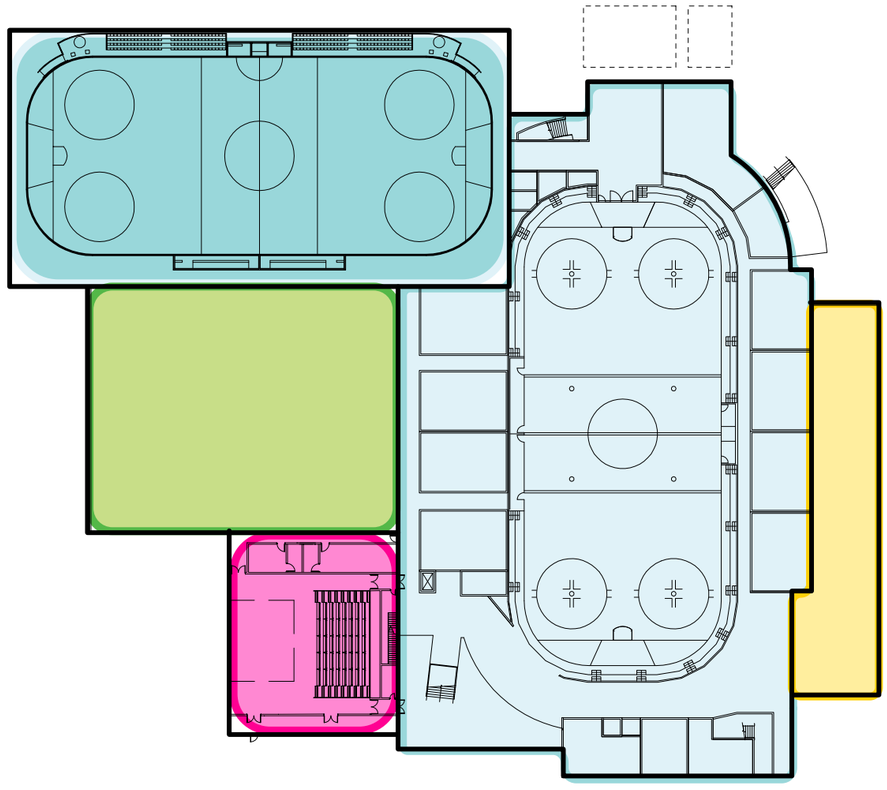
APPROVED FUNCTIONAL PROGRAM AREAS

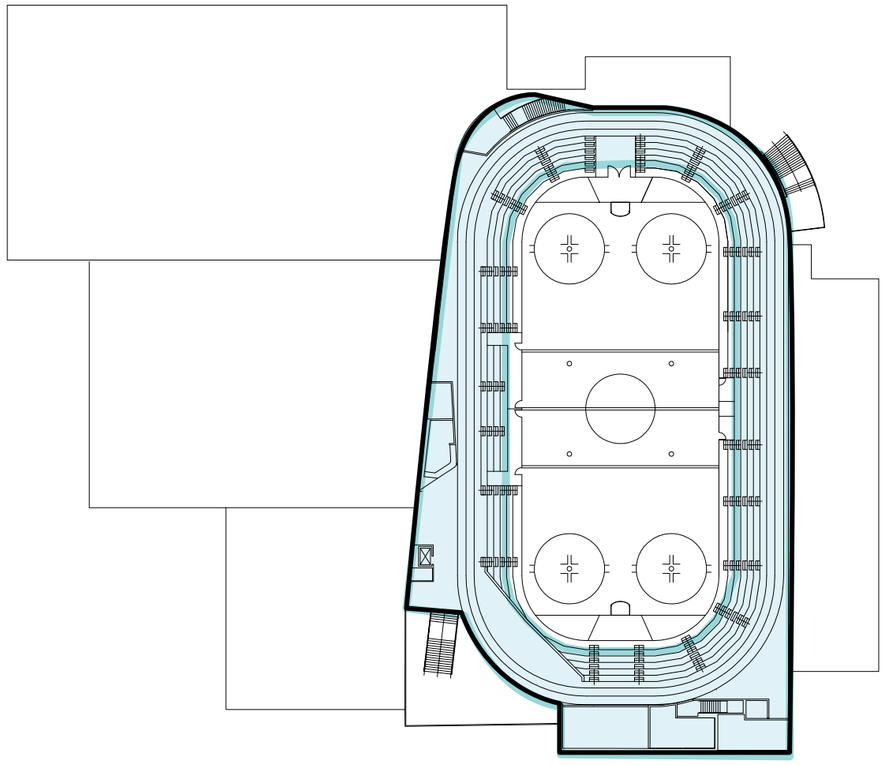
FUNCTIONAL PROGRAM	AREA m^2	AREA ft^2
Spectator Arena	6,371	68,579
Spruce Grove Saints*	465	5,000
Community Arena	2,854	30,726
Cultural Space - Black Box Theatre	665	7,155
Cultural Space - Library/Art Gallery	1,300	14,000
GROSS FLOOR AREA (GFA)	**11,660**	**125,460**

*Program to be included only if required

FUNCTIONAL PROGRAM

CONCEPT PLAN





BLACK BOX THEATRE (150 seat)
665 m² / 7,155 ft²

LIBRARY AND ART GALLERY
1,300 m² / 14,000 ft²

SPRUCE GROVE SAINTS*
465 m² / 5,000 ft²

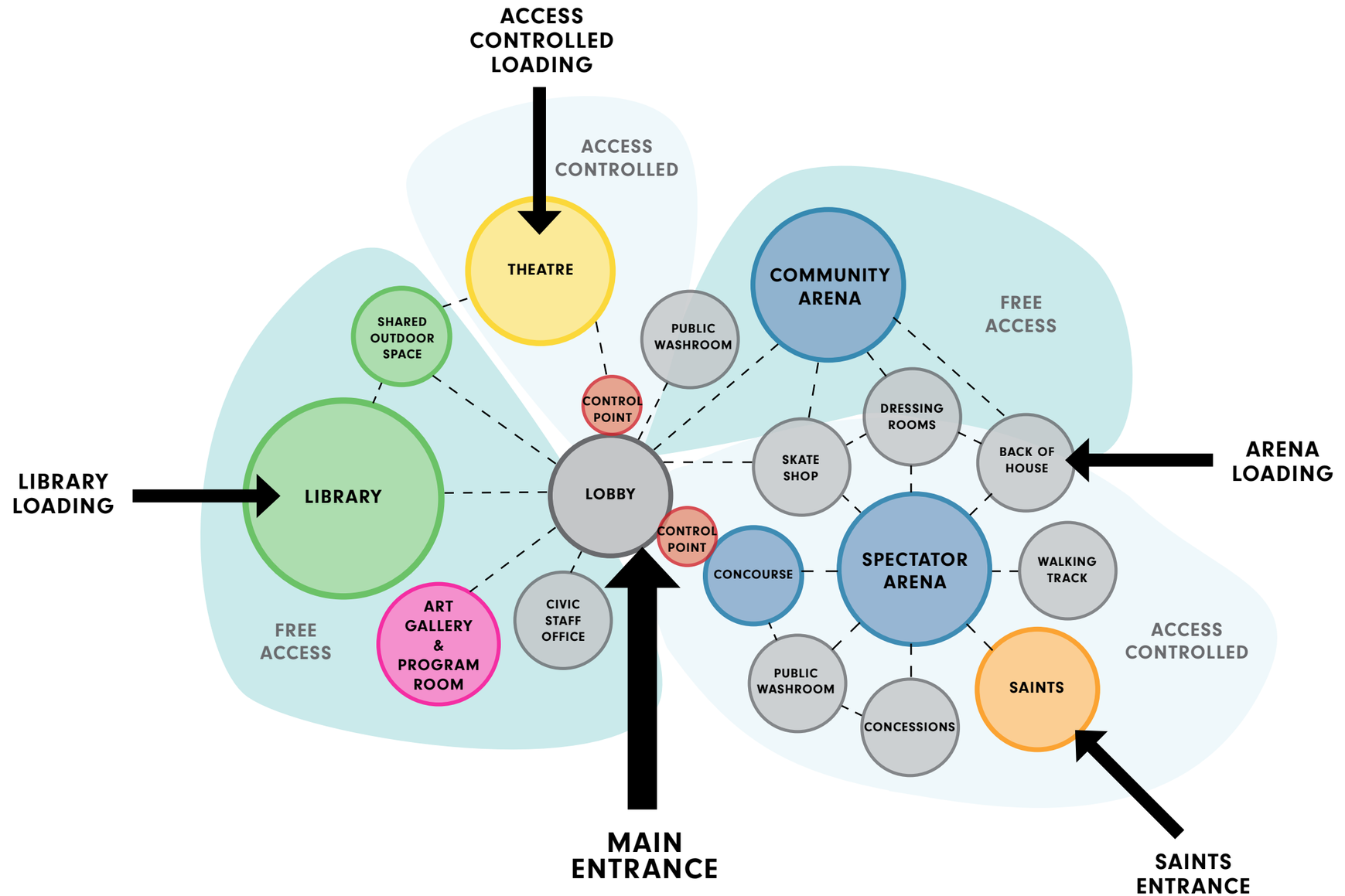
COMMUNITY ARENA (250 seat)
2,854 m² / 30,726 ft²

SPECTATOR ARENA (1400 seat)
6,371 m² / 68,579 ft²

*Program to be included only if required

2.5 Building Control Strategy

A central lobby permits access to all the building's main programs. This includes the library, theatre, art gallery and program room, and both the spectator and community arena. Controlled access is provided to the second floor of the spectator arena concourse. If required through this central lobby, a controlled access can also be provided into the theatre. Separate entrances which do not connect directly to the lobby for the dressing room & community arena. Direct loading access is provided into the back of house for both arenas. Loading is also provided for the theatre and library.



FLOW DIAGRAM

*Program to be included only if required






3.0

SITE DESIGN





3.0 Site Design

3.1 Site Description & Land Use Requirements

The new multi-use facility and Transit Centre will be located on the northeast corner of the city. The site is located directly to the south of Highway 16 and east of Century Road. The Transit Centre is planned to be located directly off Westwind Drive in between the two access points into the Civic Centre site.

The project site is relatively flat and slopes less than 1% towards a stormwater pond. This pond is located between Highway 16 and the project site. The east side of the project site will be abutted directly, with the residential row housing or single-family homes. A berm will be required along the east property line to separate the residential and commercial zones. The west side of the project site has not yet been developed, and to GEC's understanding, a use has not been determined for this site.

As per the City of Spruce Grove, Bylaw C-1167-21, Section 126A SE, this parcel of land falls within Sports and Entertainment District. The following are the development regulations defined within this zoning bylaw.

Development Regulations	Site Standard
Front Yard Setback	6.0 m
Site Yard Setback	4.0 m
Rear Yard Setback	7.5 m
Site Coverage	60%
Building Height (Max)	16 m

Other sections of the City of Spruce Grove Land Use Bylaw will also apply, including but not limited to landscaping, parking, fencing, garbage and containment areas, lighting, fire hydrants.

CONTEXT MAP

3.0 Site Design

3.2 Existing Conditions

The 13.5 acre site is currently in the process of being developed by Cantiro, the current land owner. It is GEC's understanding the City of Spruce Grove will receive clear title of property in the late summer/early fall of 2022. It is expected the following will be taking place up until the city takes ownership of the property:

- The new road, Westwind Drive, will provide access from Century Road to the site and future residential developments to the east will be constructed. This scope includes partial construction of the entry points into the site.
- Construction and installation of all utilities and services within the area, including for the site.
- Rough-grading for the site.
- Construction of a site dewatering system, using a French drain system.

The property to the west is not currently developed. The area directly to the south of Westwind Drive will be single-family homes. The area to the east of the Civic Centre will also be for residential housing.

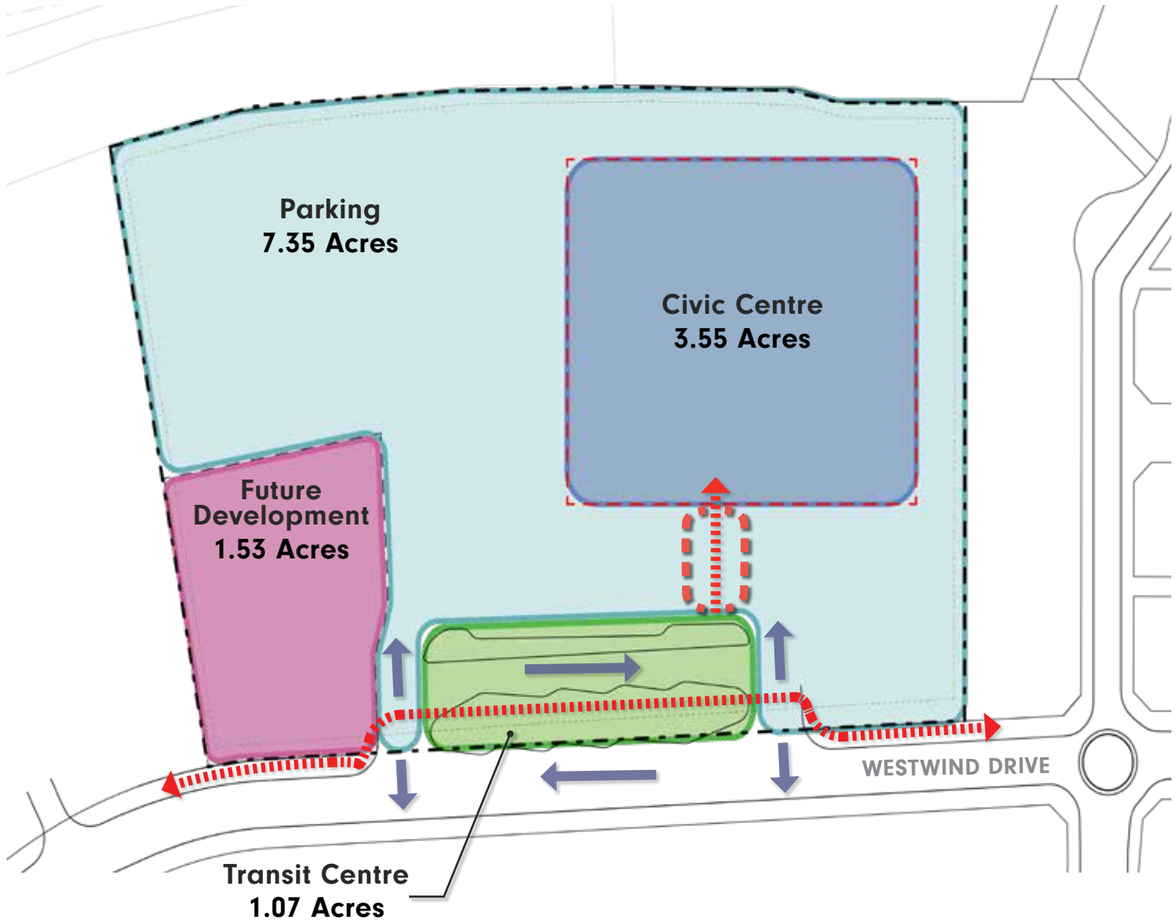
3.3 Future Development

Every effort was made by the both the design team and the City of Spruce Grove to maximize the 13.5-acre (5.47 ha) site. Every effort was made to allow for future development and densification inside the project site.

On the existing parcel, as shown on the master plan, the Civic Centre and Transit Centre are accessed off Westwind Drive. Because the smaller recommended parking count is being used (see next section), and the westbound bays of the Transit Centre are directly off Westwind Drive, there is an additional space that can be reclaimed on the site.

Designing for adaptability and future development potential ensures that the City of Spruce Grove's immediate and long-term needs can be accommodated. This additional area on the site could be either used as a commercial site which has a direct pedestrian connection to the Civic Centre and Transit Centre. Should additional parking be required in the future, this could also be used to expand the parking lot.

CONCEPTUAL SITE MASTER PLAN



Civic Centre
3.55 Acres

Parking
7.35 Acres

Transit Centre
1.07 Acres

Future Development
1.53 Acres

3.4 Site Design

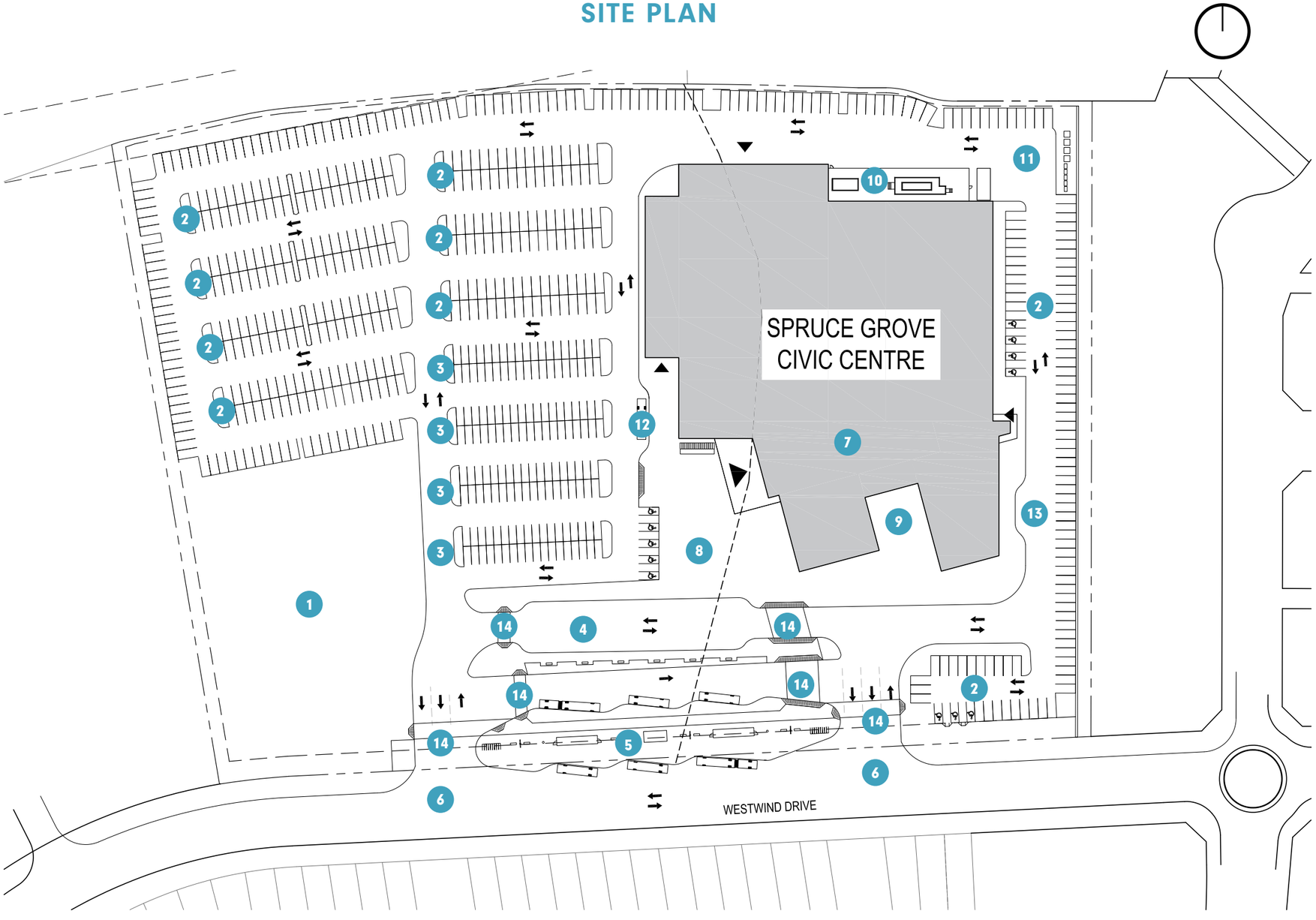
3.4.1 CIVIC CENTRE

The Civic Centre will be on the site as far to the northeast as possible, while still allowing for a 9m access road around the north and east side of the Civic Centre. The primary parking lot will remain on the west side of the site. Access to the transit center will be to the south

1 Future Property
2 Parking - Short Stalls
3 Parking - Typical Stalls
4 Kiss & Ride, & Drop Off Area
5 Transit Centre
6 Site Access Points
7 Civic Centre
8 Public Plaza
9 Semi-Private Couryard
10 Back of House
11 Garbage Collection
12 Loading
13 Loading for Library
14 Pedestrian Crossing

➡ Vehicle Direction of Travel
▶ Building Entry Point

SITE PLAN



3.0 Site Design

3.4 Site Design

3.4.2 TRANSIT CENTRE

The Transit Centre will be located between the two primary access points into the site and directly to the north of Westwind Drive. We understand the program for the Spruce Grove Transit Centre to be as follows:

- Two universal operator's washrooms for transit operators.
- A transit island with a central passenger platform and capacity for six buses, including two articulated buses.
- Kiss and ride drop off area to the north.
- A heated shelter on the central platform.
- 194 park & ride stalls, to be integrated into the Civic Centre parking lot.
- 6 bicycle racks.

This master plan was selected for the following reasons:

- Most flexible Transit Centre option because buses can continue east on Westwind Drive after stopping at Transit Centre.
- Vehicle entrance points into the site do not need to be modified.
- The future commercial parcel has access to parking lot to the east.
- Bus shelters can be efficiently located on a centralized platform that provide access to both the north and south sides of the transit island.
- The Civic Centre is mostly located on "good soil".
- Private vehicles and bus traffic can be separated.
- The Transit Centre is pulled away from the residential neighbourhood to the south.

BUSES

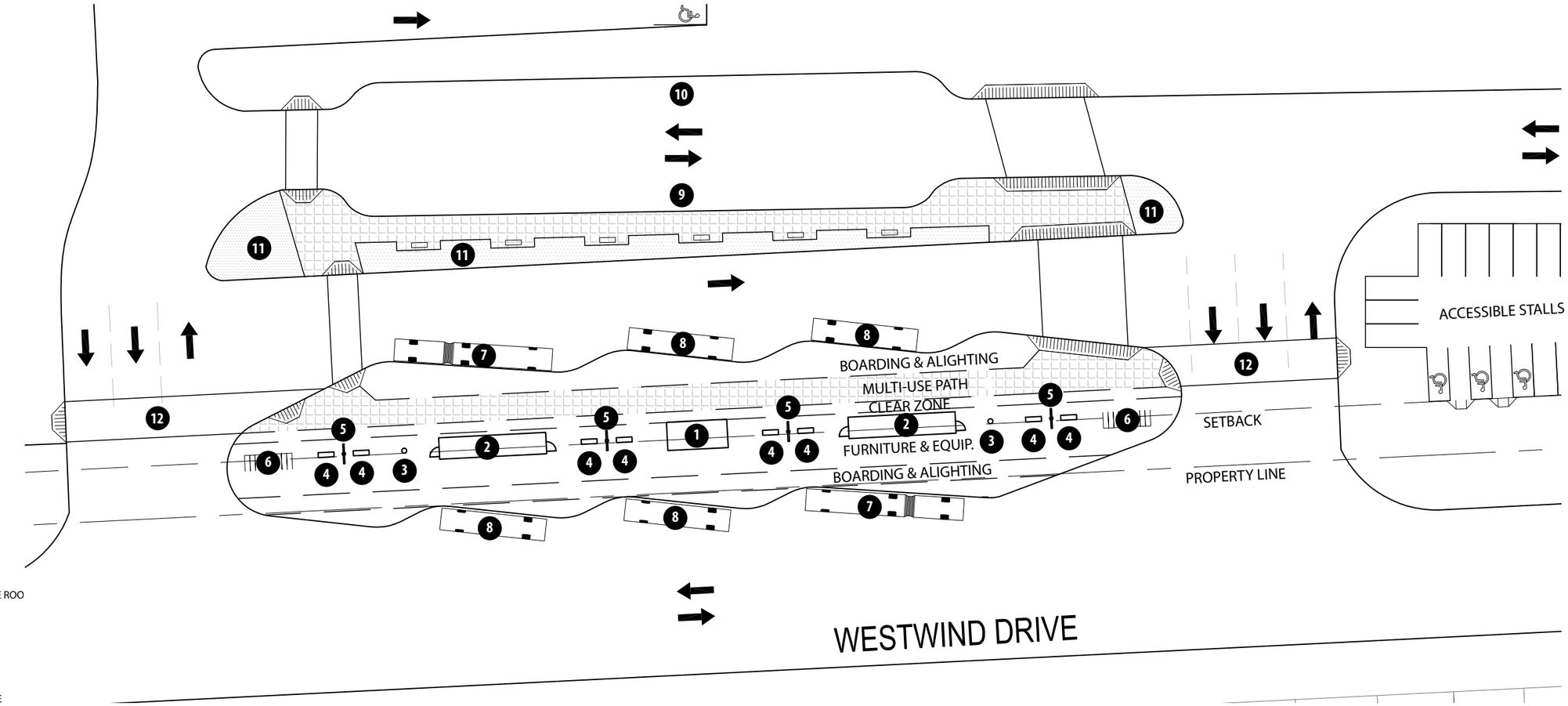
The City of Spruce Grove Transit currently has two bus models in their inventory. They, however, have asked that the Transit Centre be designed to accommodate the following buses. The articulated buses noted below are not currently in their inventory.

BUS MODEL	L ft	W ft	H ft
Flyer Model XD40	41	8.5	10.5
ARBOC Spirit of Freedom	26	8.0	9.17
Flyer Model Xcelsior - Articulated	60	8.5	10.5

The Transit Centre will be designed as per the City of Edmonton, Transit Design Guidelines.

3.4.2 TRANSIT CENTRE

ENLARGED PLAN
TRANSIT CENTRE

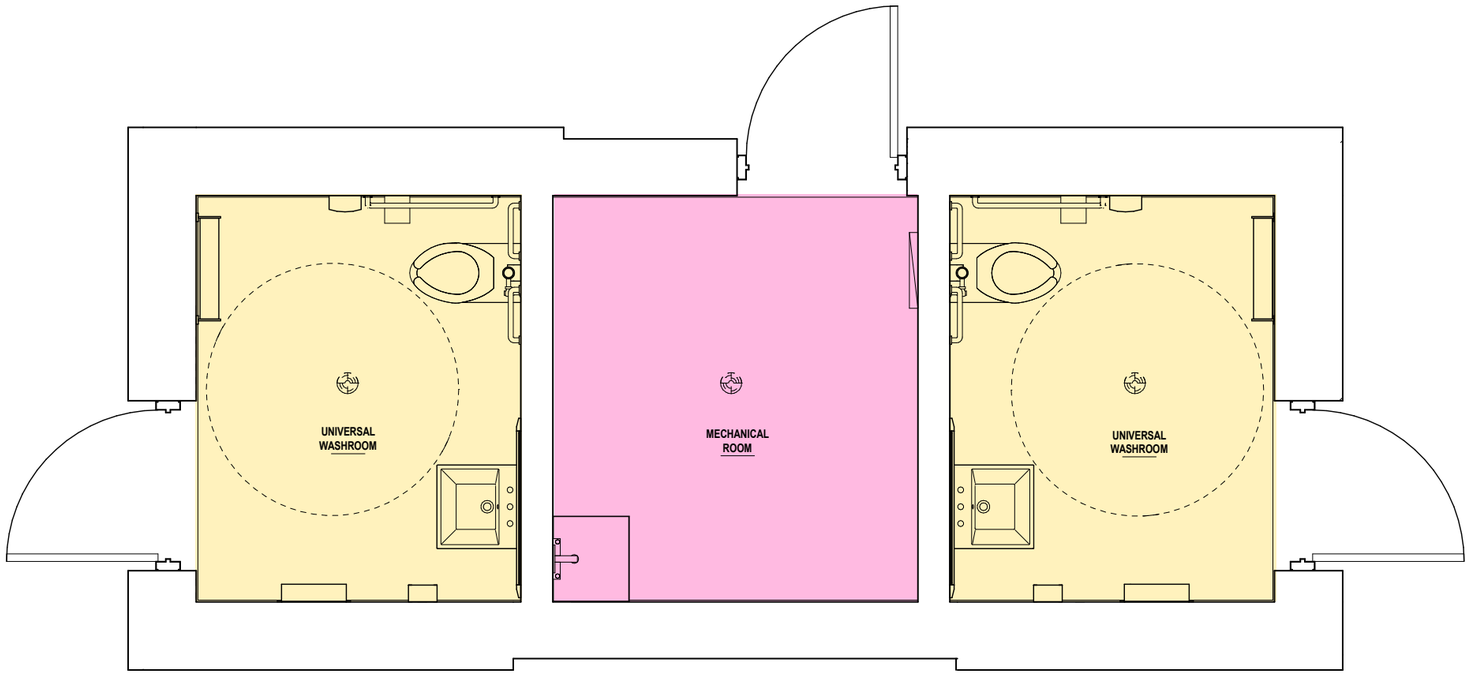


1. OPERATOR WASHROOM AND SERVICE ROO
2. ENCLOSED HEATED SHELTER
3. GARBAGE CAN
4. BENCH
5. COMBINED LIGHT AND CAMERA POLE
6. BICYCLE PARKING
7. ARTICULATED BUS BAY
8. STANDARD BUS BAY
9. KISS AND DRIVE
10. CIVIC CENTER PLAZA & DROP OFF AREA
11. LANDSCAPE
12. CROSS WALK

3.4.2 TRANSIT CENTRE

SITE PLAN

OPERATOR'S WASHROOM



1 DD-A201 DD LEVEL 01 FLOOR PLAN

Scale: 1 : 20

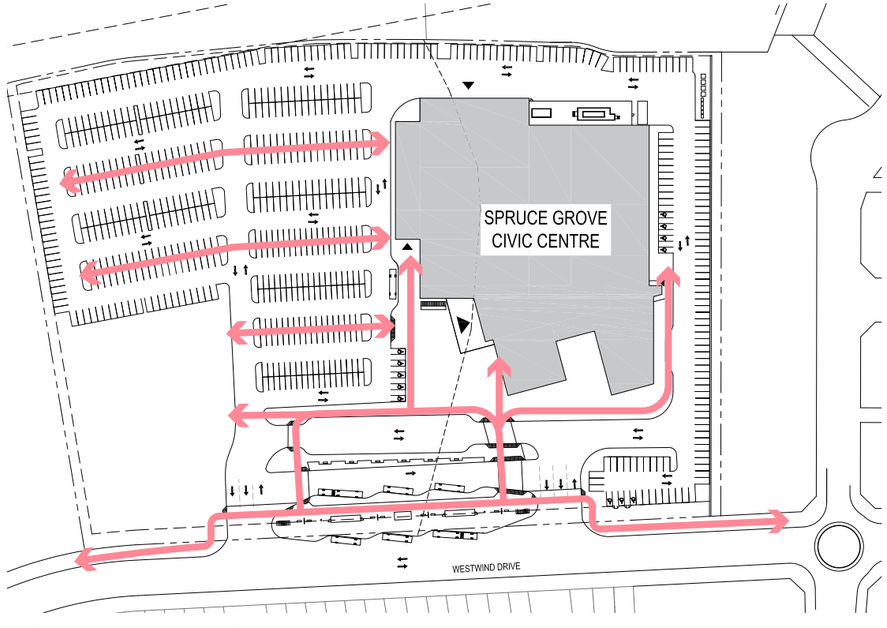
Operator Washroom

Service Space

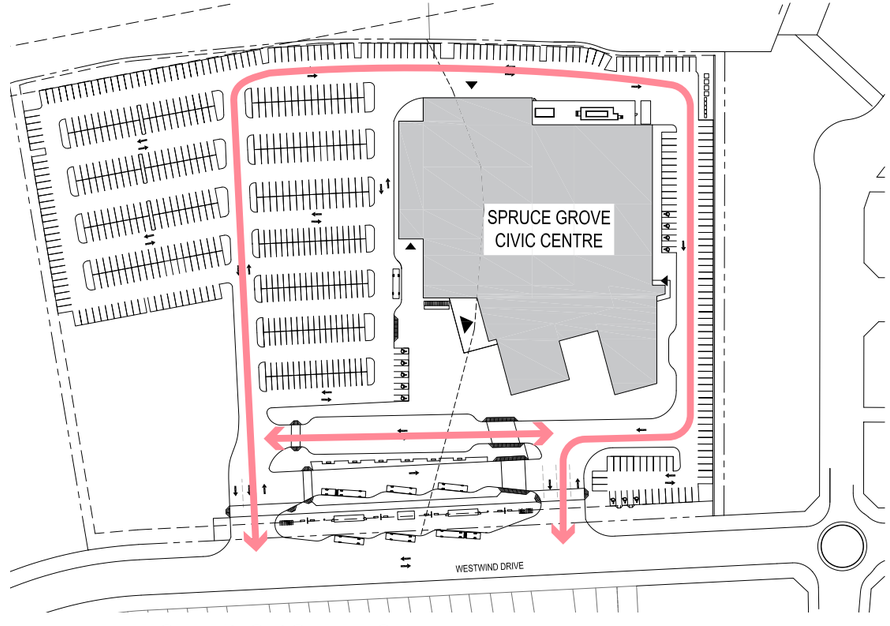
3.0 Site Design

3.4 Site Design

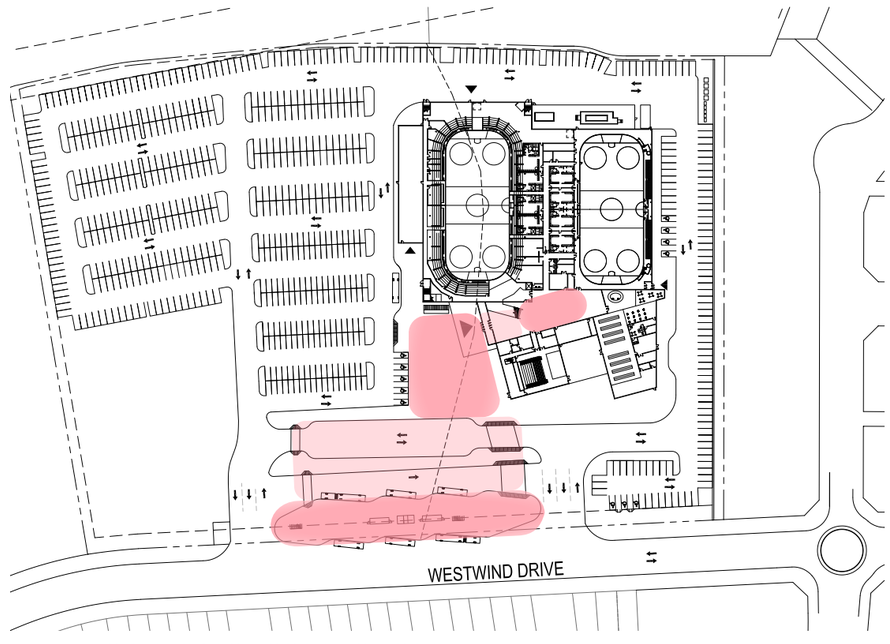
3.4.3 SITE CIRCULATION



PEDESTRIAN CIRCULATION



VEHICULAR CIRCULATION



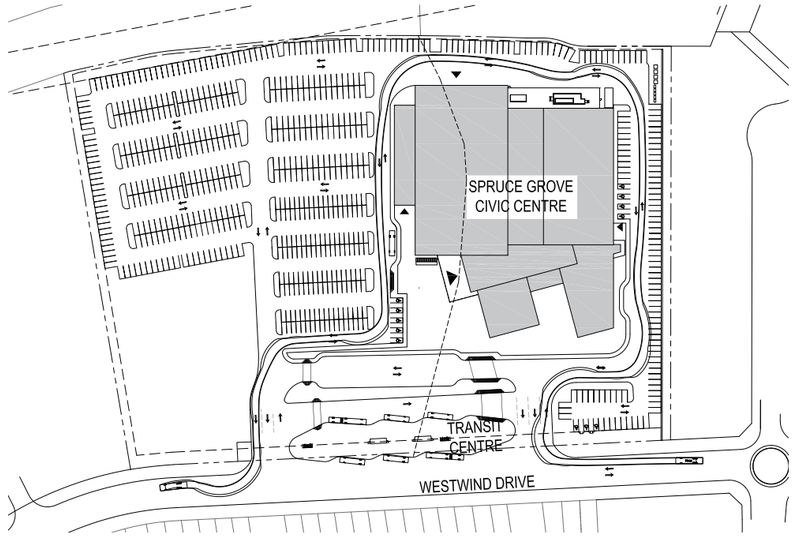
OPEN SPACE CONNECTIONS

3.0 Site Design

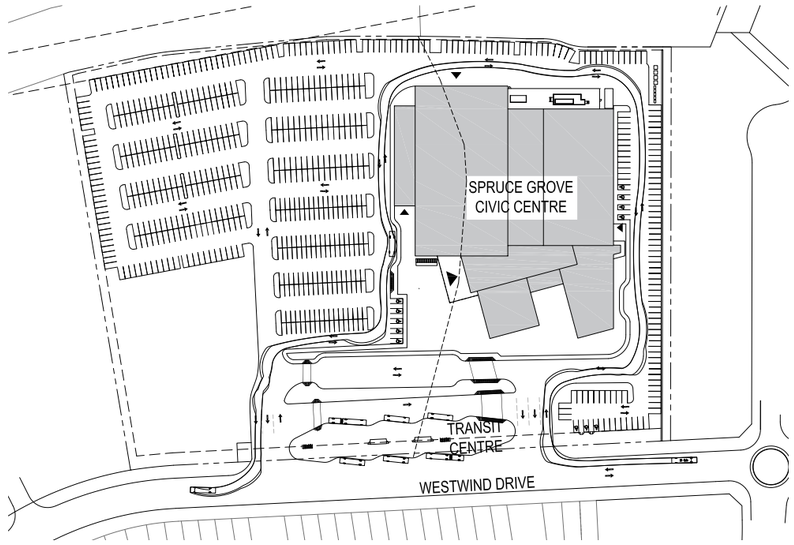
3.4 Site Design

3.4.4 SWEEP ANALYSIS

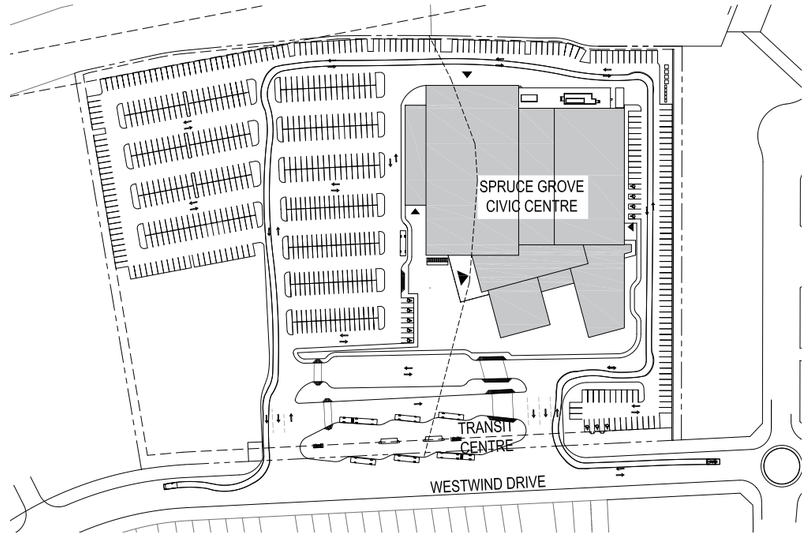
The site has been designed to accomodate various types of vehicles. A sweep analysis was completed early on to determine the main principle routes of major vehicle traffic on the site, including semi-truck, fire-truck, buses, and garbage trucks.



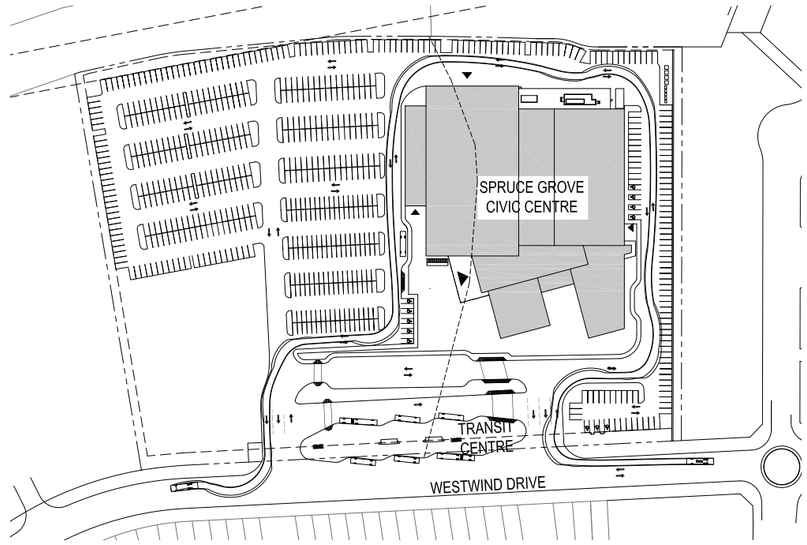
SEMI-TRUCK



BUS



SU-9 GARBAGE TRUCK



FIRE TRUCK

3.5 Transportation Assessment

A Transportation Impact Assessment (TIA) was also prepared by Bunt & Associates to confirm the site access lane arrangements and traffic control along Westwind Drive. This assessment included a review of typical evening peak hour traffic volumes and traffic volumes associated with regularly occurring events. The site is projected to generate a total of approximately 387 two-way trips in the evening peak hours and 736 two-way trips in the evening event hours.

The report provided the following recommendations:

- Bus movements are generally projected to operate well, with average delays of less than 15 seconds; however, it is noted that the two southbound left turning buses at the Westwind Drive/Civic Centre Access 2 intersection may experience delays greater than 50 seconds during peak hours if the intersection is not signalized.
- Internal vehicle connections should be provided between the existing Westwind Centre, remnant parcel, and the Civic Centre site to allow traffic to disperse to multiple accesses.
- Signalization of the Westwind Drive/Civic Centre Access 2 intersection should be considered to help facilitate and prioritize transit movements; however, either Access 1 or Access 2, not both, could be signalized. Both accesses should be monitored as development progresses in the area to confirm if, where, and when signalization is required.
- The City of Spruce Grove should continue to work with neighbourhood developers to determine the most appropriate intersection treatment at the Westwind Drive/residential access intersection.

At the current moment, the City of Spruce Grove is not proceeding with signalizing the two principal entrances into the Civic Centre. These may be added in the future if required.

For additional information please refer to the Traffic Impact Assessment prepared by Bunt & Associates.

3.6 Parking Strategy

A Parking Impact Assessment (PIA) was prepared to identify the recommended parking supply required to accommodate the build-out of the Civic Centre. Characteristics of the facility were based on existing and future land uses using information provided by the City of Spruce Grove; patron loads and parking demands were estimated using first principles.

Based on the assessment completed, Bunt & Associates provided the following recommendations:

- It is recommended that a parking supply in the order of **710 to 744** stalls be provided to accommodate typical demands during an event.
- If the provision of 710 to 744 on-site parking spaces is not achievable, parking management strategies similar to special event plans could be implemented, such as limiting concurrent activities with the same peaking characteristics. For example, if on-site events are coordinated such that a performance at the black box theatre does not coincide with a major event, an effective parking supply in the range of **597 to 625** stalls could be realized.
- It is recommended that special event parking programs be developed as required to ensure adequate accessibility and parking (on or off-site) is provided during special event activities.
- It is recommended that all stalls are unreserved spaces to ensure they are shared and available to all users.

It is GEC's understanding the City of Spruce would like to proceed with Scenario 2 noted below. The current site plan can accommodate **638** stalls. Of these 638 stalls 20% of these stalls will be designated as short stalls.

SCENARIO	PARKING REQUIRED	HIGH	LOW
1	Spectator Arena (1400 seat) & Black Box Theatre (150 seat) in operation at the same time. Community Rink, Gallery and Library also in operation.	710	744
2	Spectator Arena (1400 seat) & Black Box Theatre (150 seat) part of same license agreement. Not to be in operation at the same time. Community Rink, Gallery and Library also in operation during an event.	597	625

Based on the lower range listed above (625 stalls) and the 2019 National Building Code-Alberta Edition, Section 3.8.2.5 – Designated Parking Spaces, the site will require ten (10) designated barrier-free parking stalls on the site, located next to a barrier-free path of travel that leads to the nearest accessible entrance. These barrier-free stalls will be included in the overall parking count and not in addition to the numbers listed above.

For additional information refer to the Parking Impact Assessment prepared by Bunt & Associates.

3.7 Landscape Architecture

LANDSCAPE REQUIREMENTS

The landscape portion for the Spruce Grove Civic Centre will be designed in accordance with City of Spruce Grove Land Use Bylaws and requirements. Landscape requirements will be based on Part 9 'Landscape Regulations' of the City of Spruce Grove Land Use Bylaw.

The site is zoned UR – Urban Reserve District. The minimum front, rear and side yard setbacks are at the discretion of the Development Authority. We are assuming a 6m wide front yard, a 1.5m wide rear yard and 4m wide side yards. A total of 2,796.67 sqm of landscaped setback area is required within the project boundary. For this area, 1 tree for every 35sqm and 1 shrub for every 15sqm of any required yard or setback shall be provided, which equals to 82 trees and 187 shrubs. In addition, 1 tree for every 20sqm and 1 shrub for every 10sqm of required parking area island shall be provided. For 639 parking stalls, 64 trees and 128 shrubs are required. In total, 144 trees and 315 shrubs are required for this site.

To provide year round colour and interest, a tree mix of approximately 30%-50% coniferous and 50%-70% deciduous shall be provided.

No existing trees are on site that can be retained.

EXISTING CONDITIONS

The proposed project area is located north of Westwind Drive and borders a residential subdivision on the east side. A narrow storm water management facility is proposed along the north property line, just south of the Highway 16 – Yellowhead Corridor.

LANDSCAPE CONCEPT

The landscape concept will be based on the architecture of the building and the anticipated pedestrian and bicycle traffic to the various building entrances. Landscape elements will contribute to make the site more attractive and integrate the building into the surrounding environment and urban fabric. The landscape concept will provide shade, screening where necessary and enhance the site aesthetically, using plant material hardy to this location.

Building entrances and important pedestrian routes will be highlighted or enhanced, guiding patrons, staff and visitors to the various entrances. Linear tree planting, groups of ornamental trees, shrub plantings and ornamental grasses will be used for this site. The main entry plaza will be mostly hardscape, with some soft landscape areas that can still be used for various activities. Tree planting creates a visual separation towards the transit centre. Various site furniture, seating opportunities, bike racks and flag poles will be added to the main entry plaza.

The Theatre and Libraray outdoor space will be mostly hard surface, with a planting element reaching into the court yard, providing some smaller break out areas. Seating opportunities for small groups of people will be provided. The Library outdoor spaces will be fenced in.

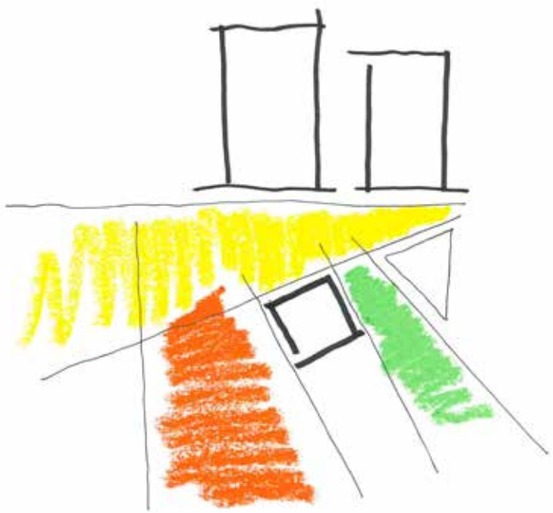
The Transit Centre area will be mostly hardscape, to accommodate the expected pedestrian traffic. Site furniture like benches, waste receptacles and bike racks will be incorporated. Where sufficient space is available outside of any pedestrian routes, some landscaping including tree planting is proposed.

A landscape buffer will be provided along the east property line, towards the residential development. Mostly coniferous trees, with some deciduous trees, will be proposed for this area.

Concrete sidewalks will connect parking areas, building entrances and provide hard surface amenity spaces. A standard broom finish and jointing pattern will be used. The concrete finish for the main entry plaza could have some sand blast pattering, providing more interest and highlighting the main entrance to the building.

Sufficient bike racks will be proposed. The product selected will be durable and low maintenance. Bike racks will be surface mounted to the concrete paving.

Ease of landscape maintenance is a major factor for this site. Shrubs and ornamental grasses will be grouped in compact planting beds and are not spread out over the entire site.



SITE PARTI - HAND SKETCH

3.0 Site Design

3.7 Landscape Architecture

PLANT SELECTION

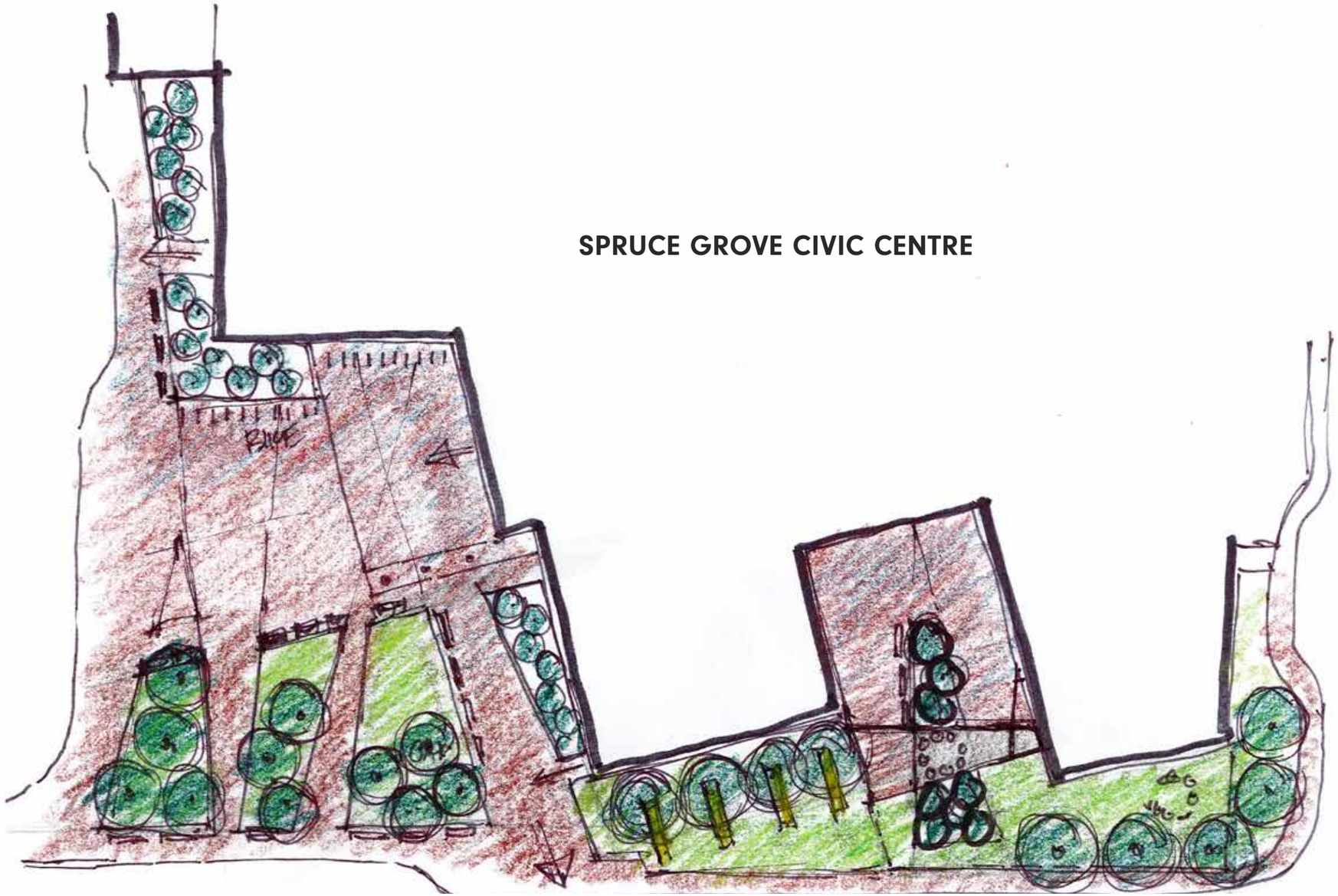
The use of drought tolerant plant material is an important factor for this site, which could include native tree species such as White Spruce or Lodgepole Pine, and adapted tree species that have proven to withstand dry and harsh conditions, like Brandon Elm, Green Ash, Larch, Crabapple varieties, Bur Oak and Japanese Tree Lilac, or shrubs like Spirea, Alpine Currant, Ninebark and Juniper. Ornamental grasses could also be part of the detailed planting concept.

The tree and shrub selection is based on appearance, hardiness, maintenance, leaf colour during the year and sun/shade exposure. Tree planting will be split about 25%-40% coniferous and 60%-75% deciduous trees. All planting beds will have a 100mm depth cover with shredded coniferous wood mulch to prevent weed growth and to keep moisture in the ground. No landscape fabric will be proposed for wood mulch areas.

Sod on 150mm topsoil will be used for most grassed areas. Fescue sod on 150mm topsoil could be used in selected areas towards the storm water management facility along the north property line.

No irrigation system will be required.

CPTED guidelines are a factor in the detailed planting layout. Shrub plantings will be low along walkways and plazas. Deciduous plant material is preferred over coniferous shrubs and trees.



SKETCH PROVIDED BY DESIGN NORTH

3.0 Site Design

3.7 Landscape Architecture

ALPINE CURRANT

BRANDON ELM

BUR OAK

FEATHER REED GRASS

GOLDFLAME SPIREA

GREEN ASH

JUNIPER

LODGEPOLE PINE

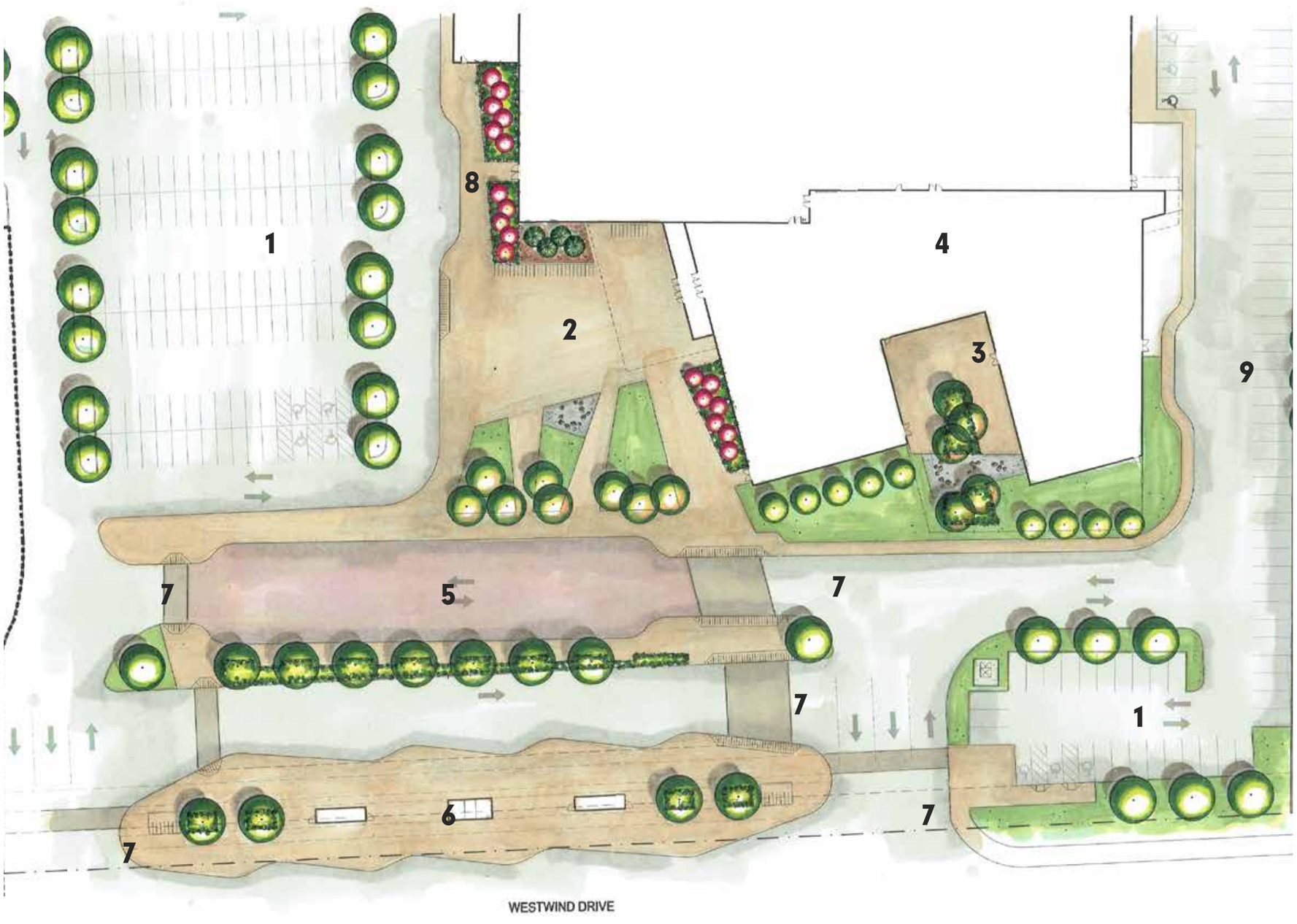
NINEBARK

SPRING SNOW CRABAPPLE

WHITE SPRUCE

NAIT EDMONTON CAMPUS

SITE LANDSCAPE PLAN



1 Parking Lot
2 Plaza
3 Open Couryard
4 Civic Centre
5 Drop-Off Area
6 Transit Centre
7 Crosswalk
8 Loading
9 Library Loading

IMAGE PROVIDED BY DESIGN NORTH

3.8 Civil Design

WATER

Existing Water Infrastructure

Two existing water service stubs have been provided off Westwind Drive, allowing for separated water servicing to the transit center and civic center.

Proposed Water Servicing

The proposed development will include a water service connection for each of the transit center and civic center. Pipes and structures will be designed and specified as per the requirements outlined in the City of Spruce Grove Municipal Development Standards.

SANITARY

Existing Sanitary Infrastructure

Two existing sanitary service stubs have been provided off Westwind Drive, allowing for separated sanitary servicing to the transit center and civic center.

Proposed Sanitary Servicing

The proposed development will include a sanitary service connection for each of the transit center and civic center. Pipes and structures will be designed and specified as per the requirements outlined in the City of Spruce Grove Municipal Development Standards.

STORMWATER

Existing Stormwater Infrastructure

Two existing stormwater stubs have been provided off Westwind Drive, with a third stub at the northeast corner of site. These services have been sized to accommodate full flows from the site, with no restriction or retention requirements. A stormwater management pond is to be constructed north of the site, intended to manage the stormwater flow for the surrounding area. Stormwater from the civic center site may be released directly to this pond, if necessary.

Proposed Stormwater Servicing

While no stormwater retention is required, it will be allowed for in the design. In the event that any on site or downstream pipes are blocked, causing a backup and flooding, spill points will be designed to prevent ponding over 300mm, with the overall site spill directing runoff to the stormwater pond to the north. The spill points will also be designed relative to the building finished floor elevation (FFE) to ensure a minimum freeboard of 300mm above the maximum ponding depth.

Storm runoff will be collected and directed to split the total flow as evenly as possible across the three outlets to ensure surcharging is avoided. Pipes and structures will be designed and specified as per the requirements outlined in the City of Spruce Grove Municipal Development Standards.

GRADING & ROADWAYS

Existing Surface Conditions

The existing site area is graded to drain south to north, with runoff directed to the stormwater management pond north of the site. The elevation drop from the road tie in at the south to the top of the pond at the north end of site is approximately 1.8m. A privacy/noise barrier is intended to be included along the east site boundary. It is our understanding that the structure will be determined based on the requirements of the civic center site design and will be either a retaining wall or elevated berm.

Proposed Grading Design

The proposed road and parking surfaces will be graded as per the City of Spruce Grove Municipal Development Standards. Longitudinal slopes will range from 1.0% to 4.0%, with cross slopes ranging from 1.0% to 5.0%.

Grading within the transit center area will be as per the ETS – Transit Center Design Guidelines.

Due to the existing elevation change from south to north, a retaining wall will likely be included along the north edge of the site.











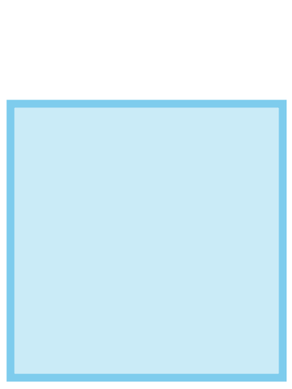
4.0

BUILDING DESIGN

4.0 Building Design

4.1 Architectural Design

CONCEPT DIAGRAMS



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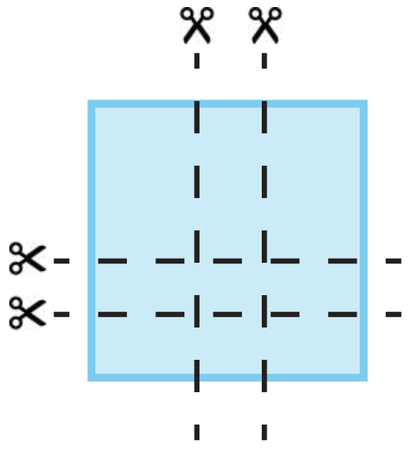

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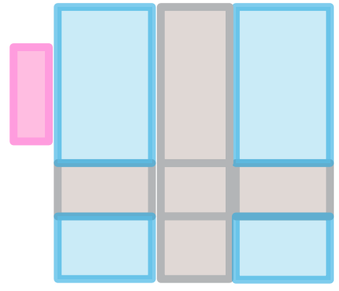
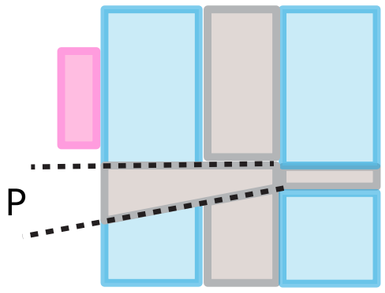
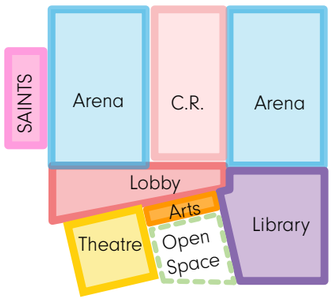


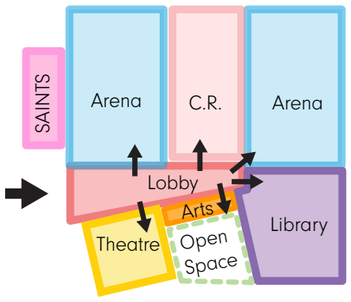
Fill & Add



Rotate & Open



Add Program



Circulation

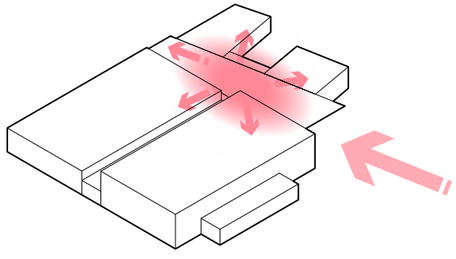
DESIGN LOGIC

4.0 Building Design

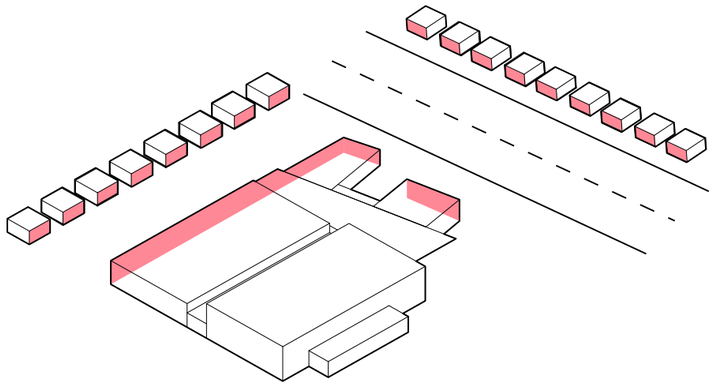
4.1 Architectural Design

FORMAL STRATEGIES

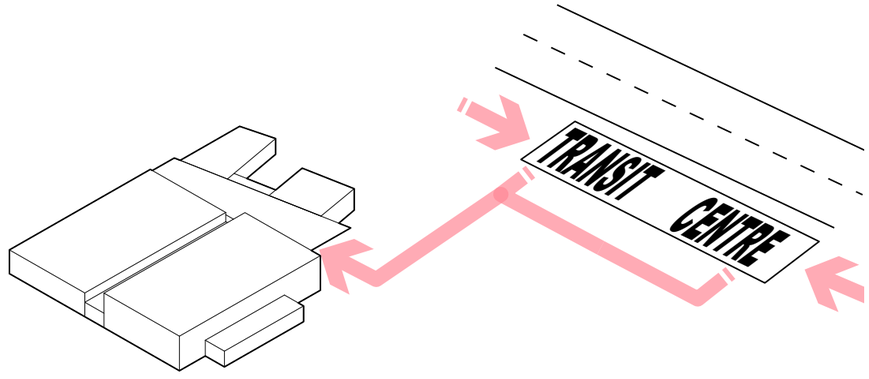
The design for the Civic Centre takes into consideration several contextual relationships. To the right you will find various guiding design principles that form part of the logic behind the design of the Civic Centre and site design.



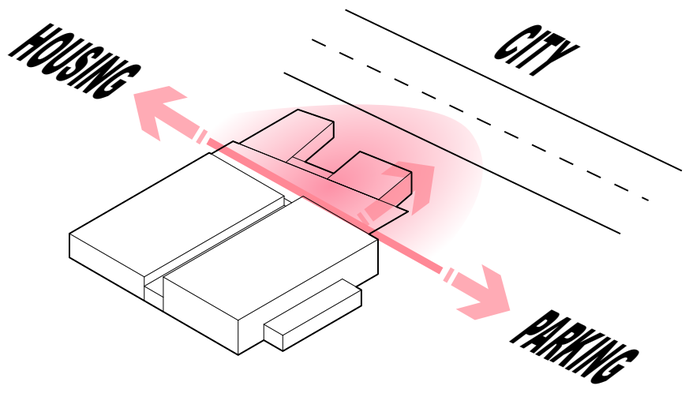
LOBBY AS COMMUNITY BUILDER



ADOPT SCALE



RELATIONSHIP WITH TRANSIT

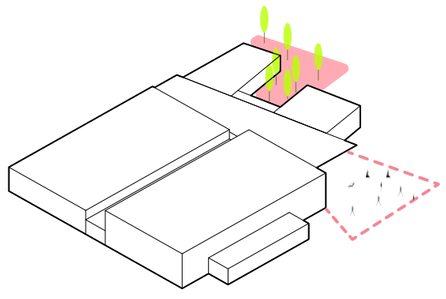


180 DEGREE CITY VIEWS

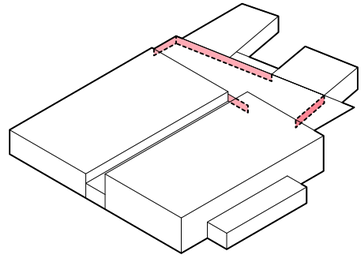
4.0 Building Design

4.1 Architectural Design

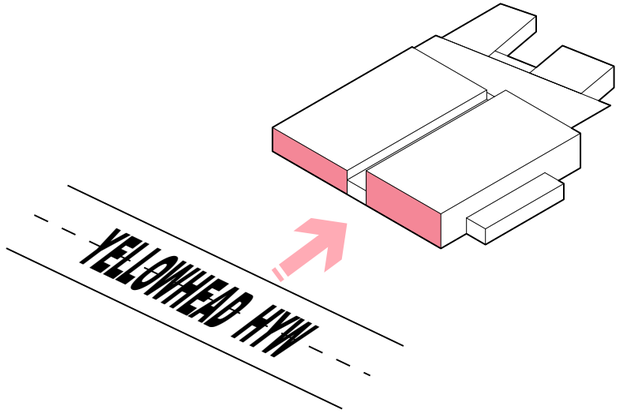
FORMAL STRATEGIES



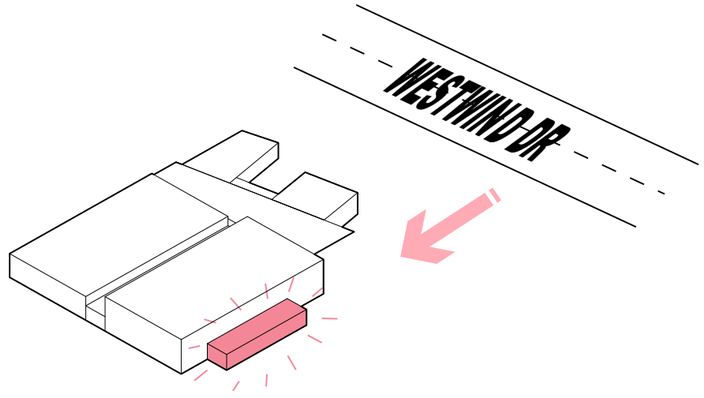
DEVELOPMENT OF OPEN SPACE



CLERESTORY LIGHT



HIGHWAY VIEW



SAINTS AS DISCRETE BUILDING

4.0 Building Design

4.1 Architectural Design

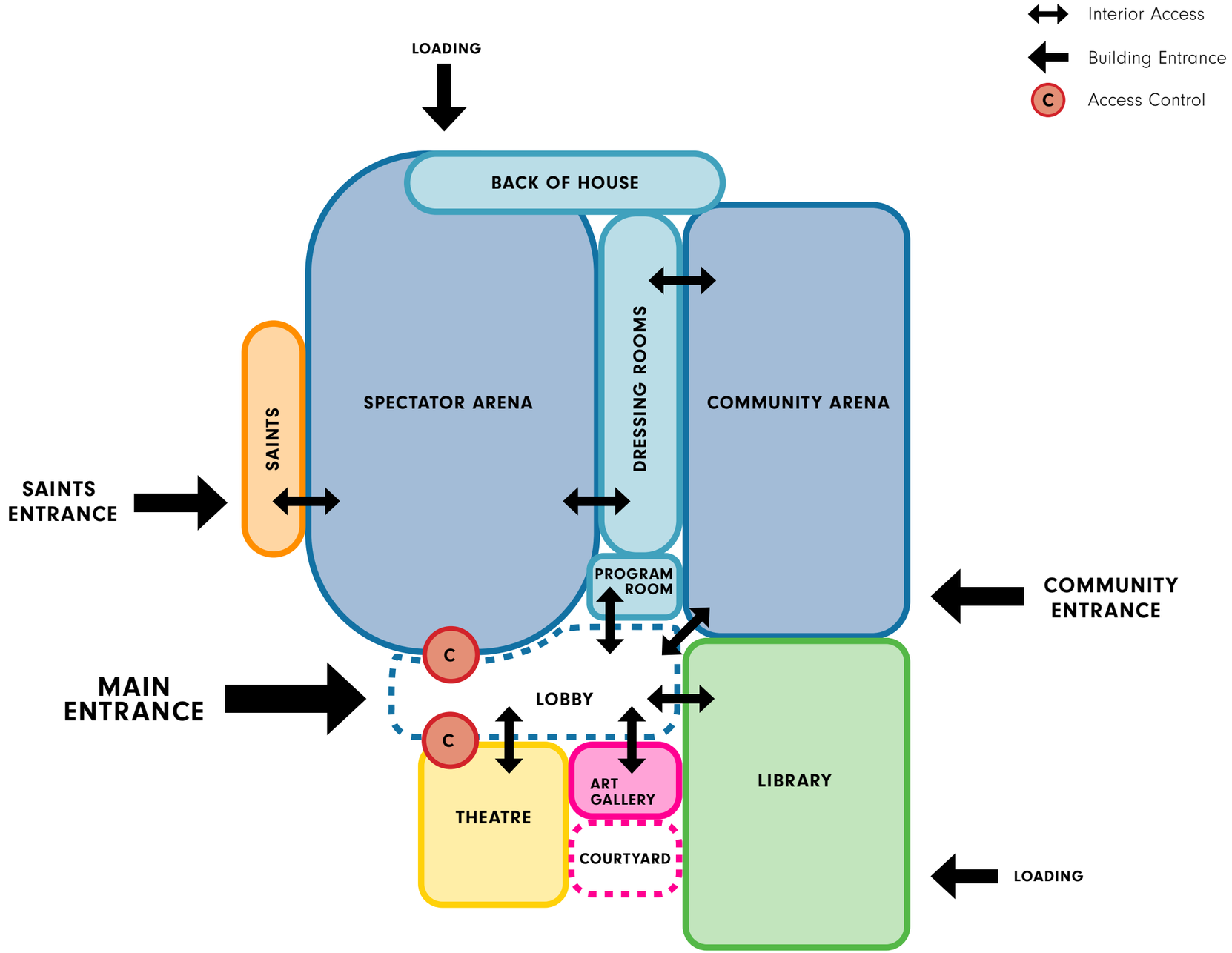
PROGRAM ARRANGEMENT

The program for the Civic Centre has been organized around a central lobby space. Both the spectator and community arenas have been oriented north-south with shared dressing rooms in between and a shared back-of-house to the north. Primary access into the spectator area is from the lobby through a control point. The community rink and dressing rooms can be accessed through either the lobby or a secondary entrance on the east side of the building.

The Spruce Grove Saint Training and Dressing area will be located to the west side of the building. This space will have direct access to the players boxes, parking lot and a drop-off and loading area. The Saints space, if required, can be completely segregated from the main Civic Centre.

The theatre is located off the main lobby and accessed through a vestibule and control point to the south. The library will be located to the south of the community arena. The art gallery will be located between the theatre and the art gallery. The program room will be located on the opposite side of the lobby, directly to the south of the dressing rooms. An exterior courtyard will be located between the theatre, art gallery and library. This exterior courtyard space can be shared amongst the three cultural building programs for events of programming.

The interior lobby space will be used for crush space for the arenas and additional programming. The lobby space will also include a box office, connections to the public washrooms and civic centre office. The lobby will also have a direct connection to the exterior public plaza to the southwest, which is a continuation of the buildings usable public space.



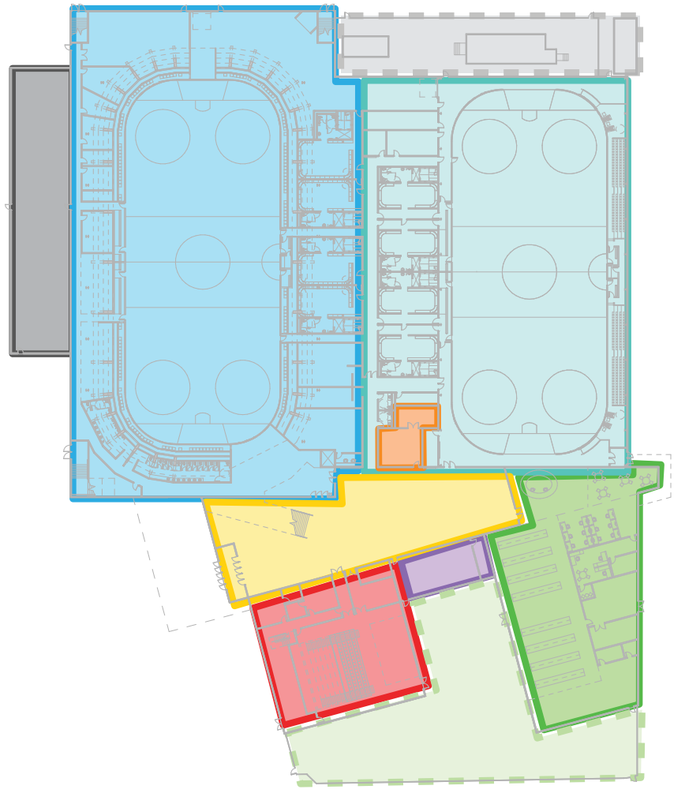
PROGRAM ADJACENCIES

*Program to be included only if required

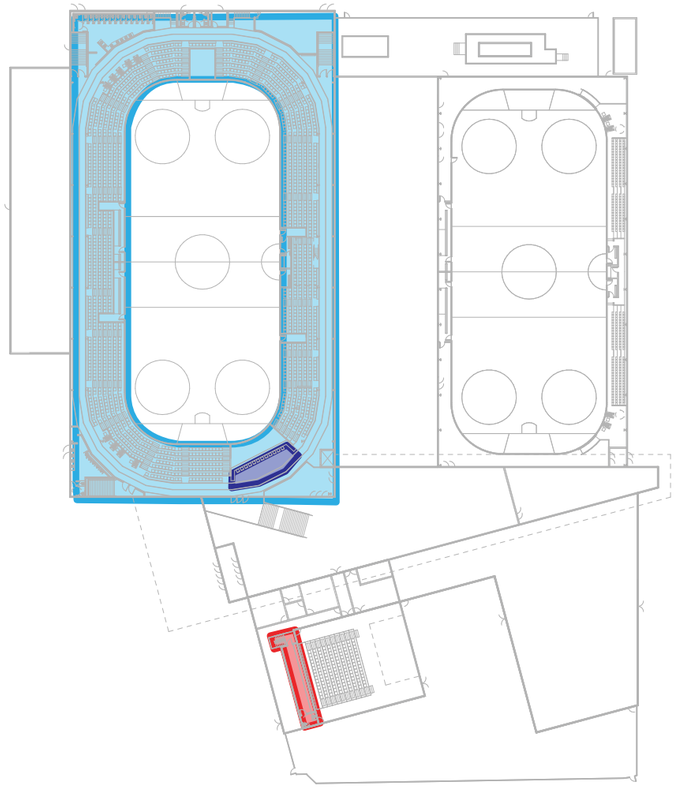
4.0 Building Design

4.1 Architectural Design

FLOOR PLANS



MAIN FLOOR



SECOND FLOOR

THIRD FLOOR

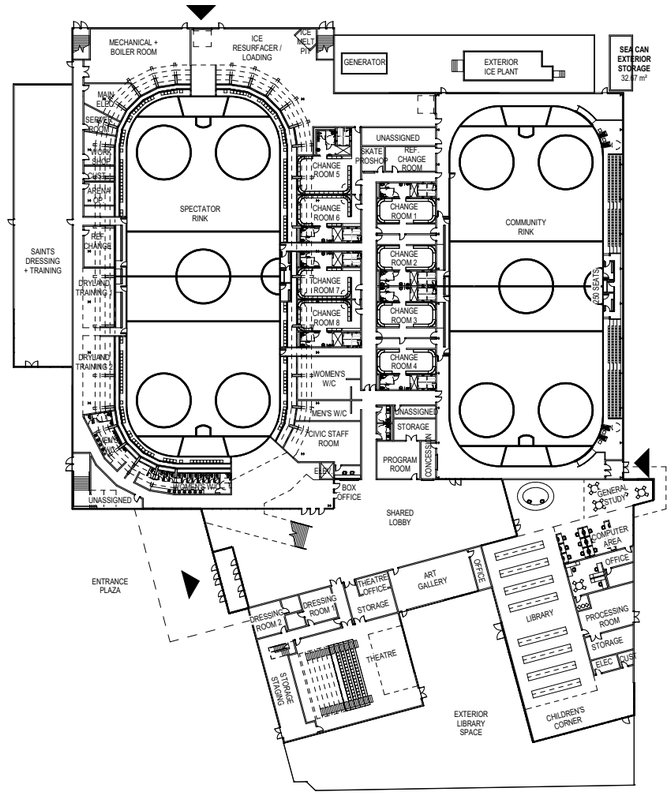
- Event Space
- Media Boxes
- Outdoor Cultural Space
- Saints Dressing and Training Space*
- Lobby and Public Washrooms
- Back of House
- Spectator Arena
- Community Arena
- Perfoming Arts
- Visual Arts Program Space
- Art Gallery
- Library

*Program to be included only if required

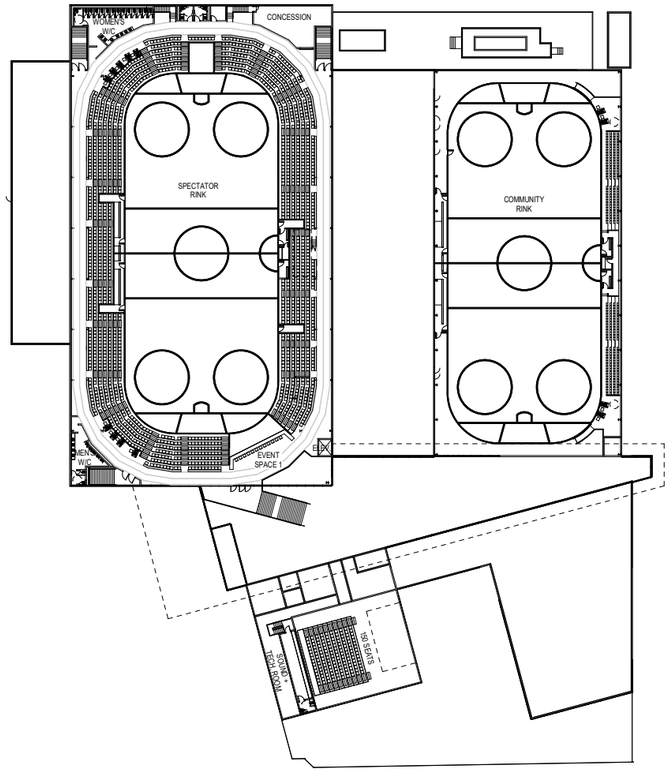
4.0 Building Design

4.1 Architectural Design

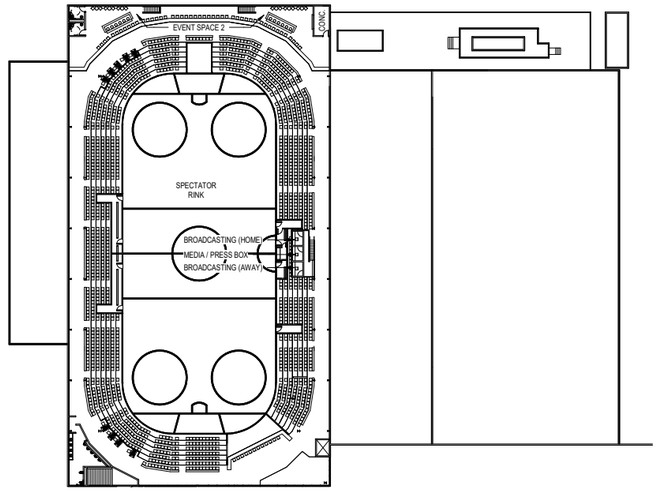
FLOOR PLANS



MAIN FLOOR



SECOND FLOOR



COMPOSITE- LEVEL 03 EVENT SPACE - PRESENTATION

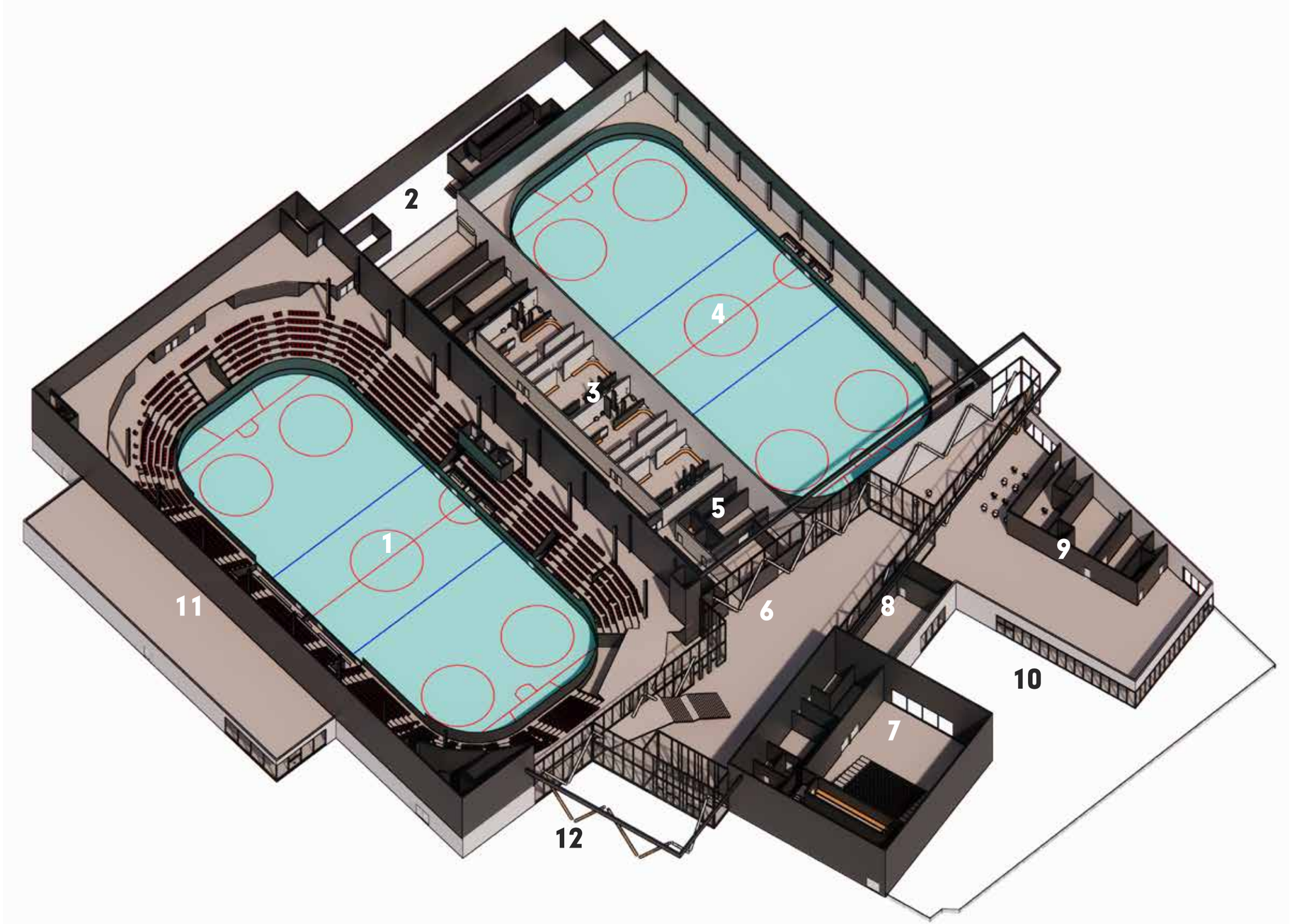
THIRD FLOOR

GROSS FLOOR AREA		
NAME	AREA m^2	AREA ft^2
Level 1 GFA	9,710	104,519
Level 2 GFA - Spec. Arena	1,980	21,314
Level 2 GFA - Theatre	51	550
Level 3 Media Box	30	320
Level 3 Event Space	253	2,719
TOTAL AREA	**12,024 m^2**	**129,423 ft^2**

4.0 Building Design

4.1 Architectural Design

3D AXONOMETRIC



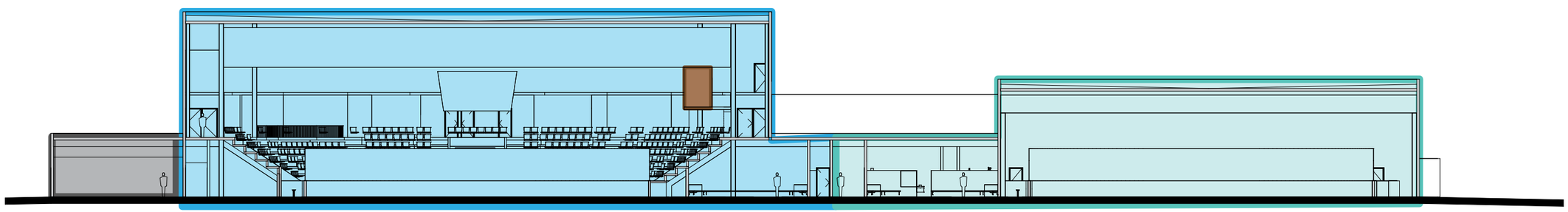
1 Specator Arena
2 Back Of House
3 Dressing Rooms
4 Community Rink
5 Program Room
6 Lobby
7 Theatre
8 Art Gallery
9 Library
10 Courtyard
11 Saints Training & Dressing Area*
12 Plaza

*Program to be included only if required

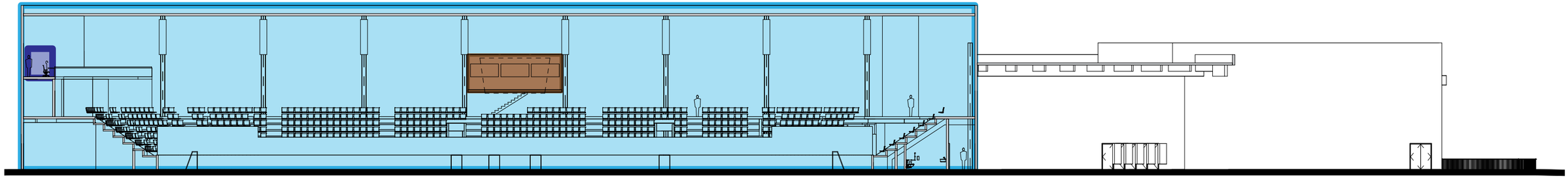
4.0 Building Design

4.1 Architectural Design

BUILDING SECTIONS



SECTION THROUGH SPECTATOR RINK AND COMMUNITY RINK



SECTION THROUGH SPECTATOR RINK

Spectator Arena

Community Arena*

Saints Dressing and Training Space

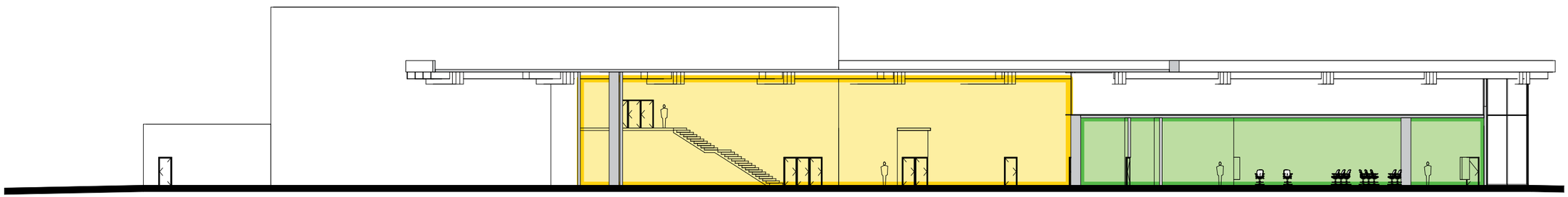
Media Boxes

*Program to be included only if required

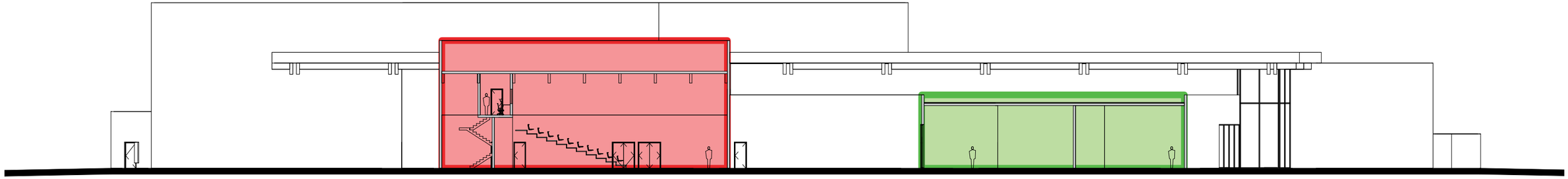
4.0 Building Design

4.1 Architectural Design

BUILDING SECTIONS



SECTION THROUGH LOBBY AND LIBRARY



SECTION THROUGH THEATRE AND LIBRARY

Perfoming Arts

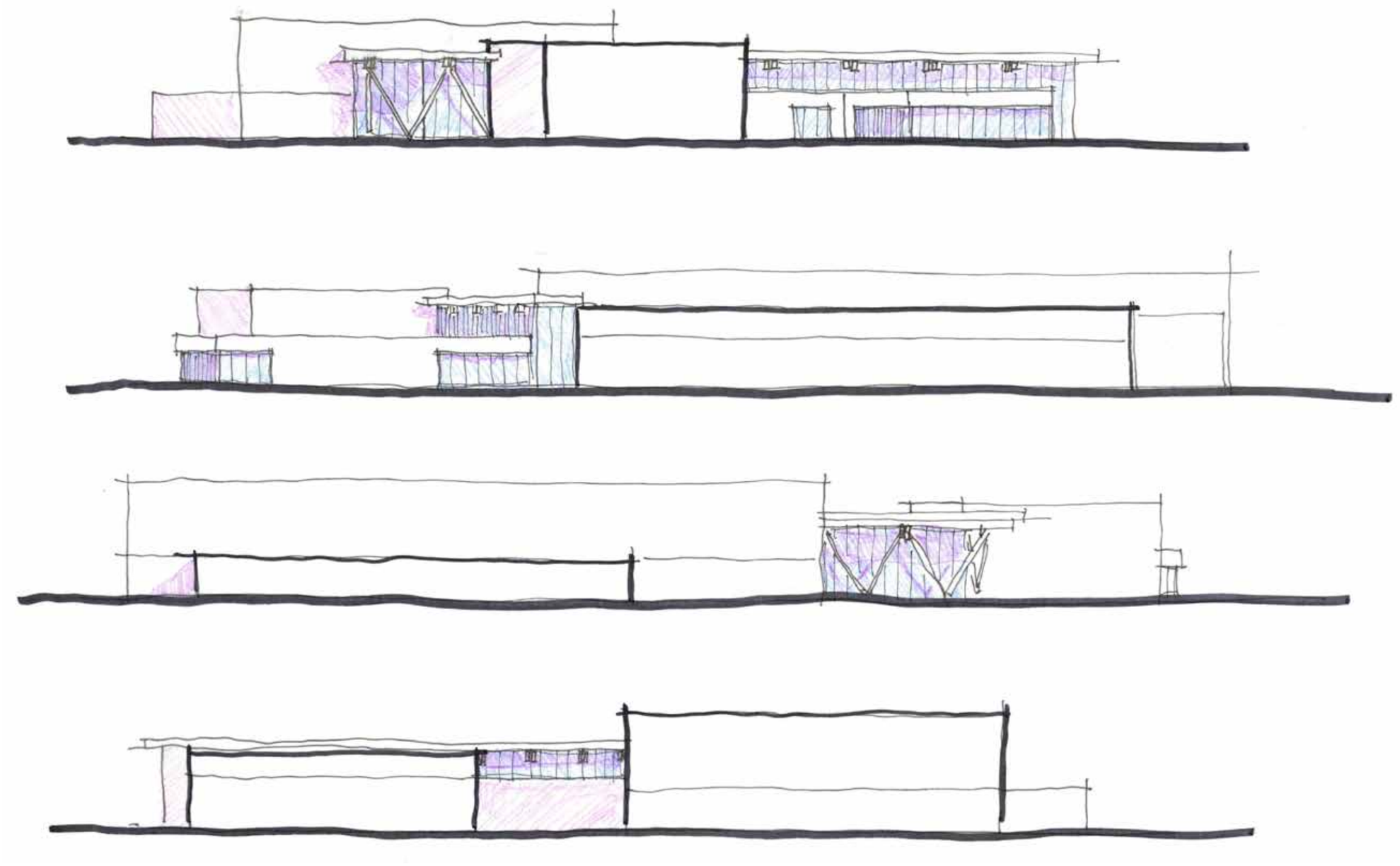
Library

Lobby and Public Washrooms

4.0 Building Design

4.1 Architectural Design

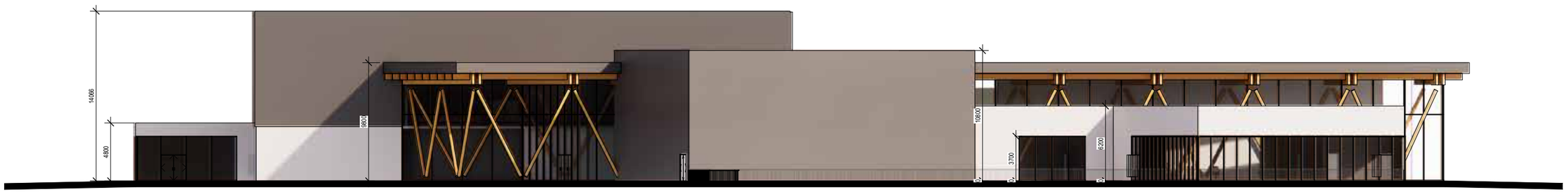
CONCEPTUAL ELEVATIONS



4.0 Building Design

4.1 Architectural Design

BUILDING ELEVATIONS



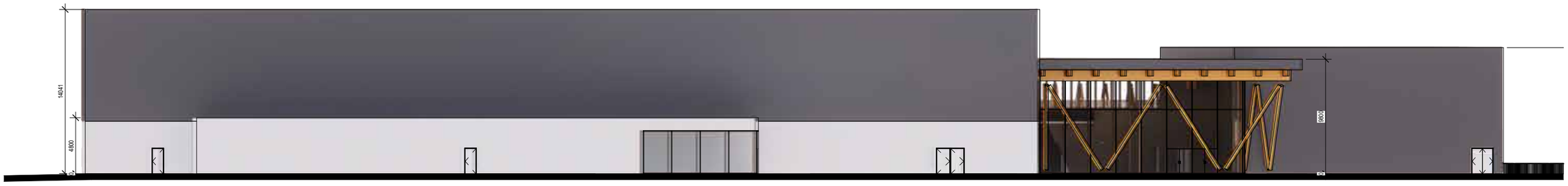
SOUTH ELEVATION

EAST ELEVATION

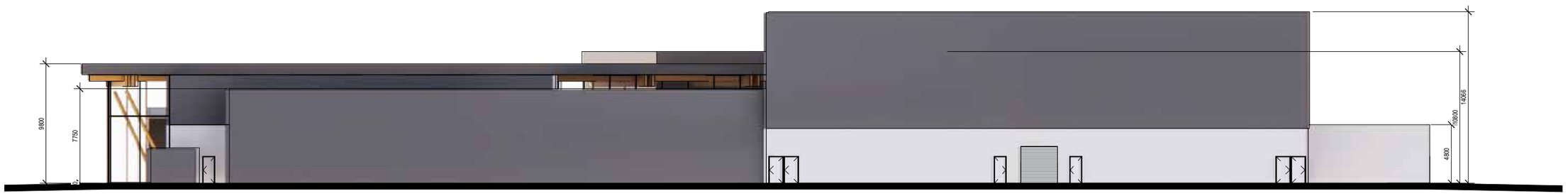
4.0 Building Design

4.1 Architectural Design

BUILDING ELEVATIONS



WEST ELEVATION



NORTH ELEVATION

4.0 Building Design

4.1 Architectural Design

EXTERIORS

AERIAL VIEW | LOOKING NORTHEAST

4.0 Building Design

4.1 Architectural Design

EXTERIORS

AERIAL VIEW | LOOKING NORTHWEST

4.0 Building Design

4.1 Architectural Design

EXTERIORS

VIEW FROM WESTWIND DRIVE | LOOKING NORTH

4.0 Building Design

4.1 Architectural Design

EXTERIORS

VIEW FROM PUBLIC PLAZA | LOOKING NORTHEAST

4.0 Building Design

4.1 Architectural Design

EXTERIORS

VIEW FROM HIGHWAY 16 | LOOKING SOUTHEAST

4.0 Building Design

4.1 Architectural Design

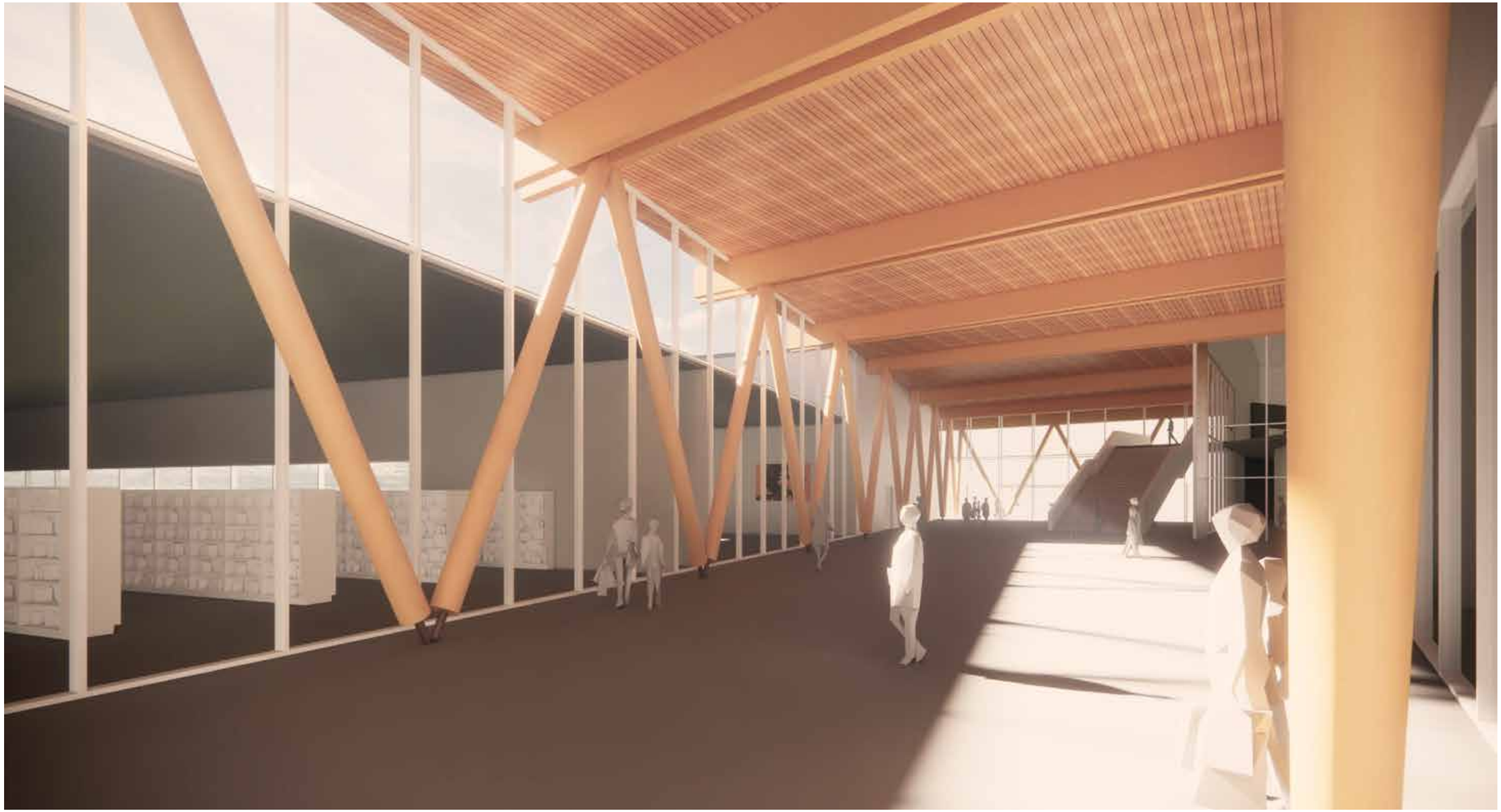
INTERIORS

LOBBY | LOOKING EAST

4.0 Building Design

4.1 Architectural Design

INTERIORS



VIEW TOWARDS ENTRANCE

4.0 Building Design

4.1 Architectural Design

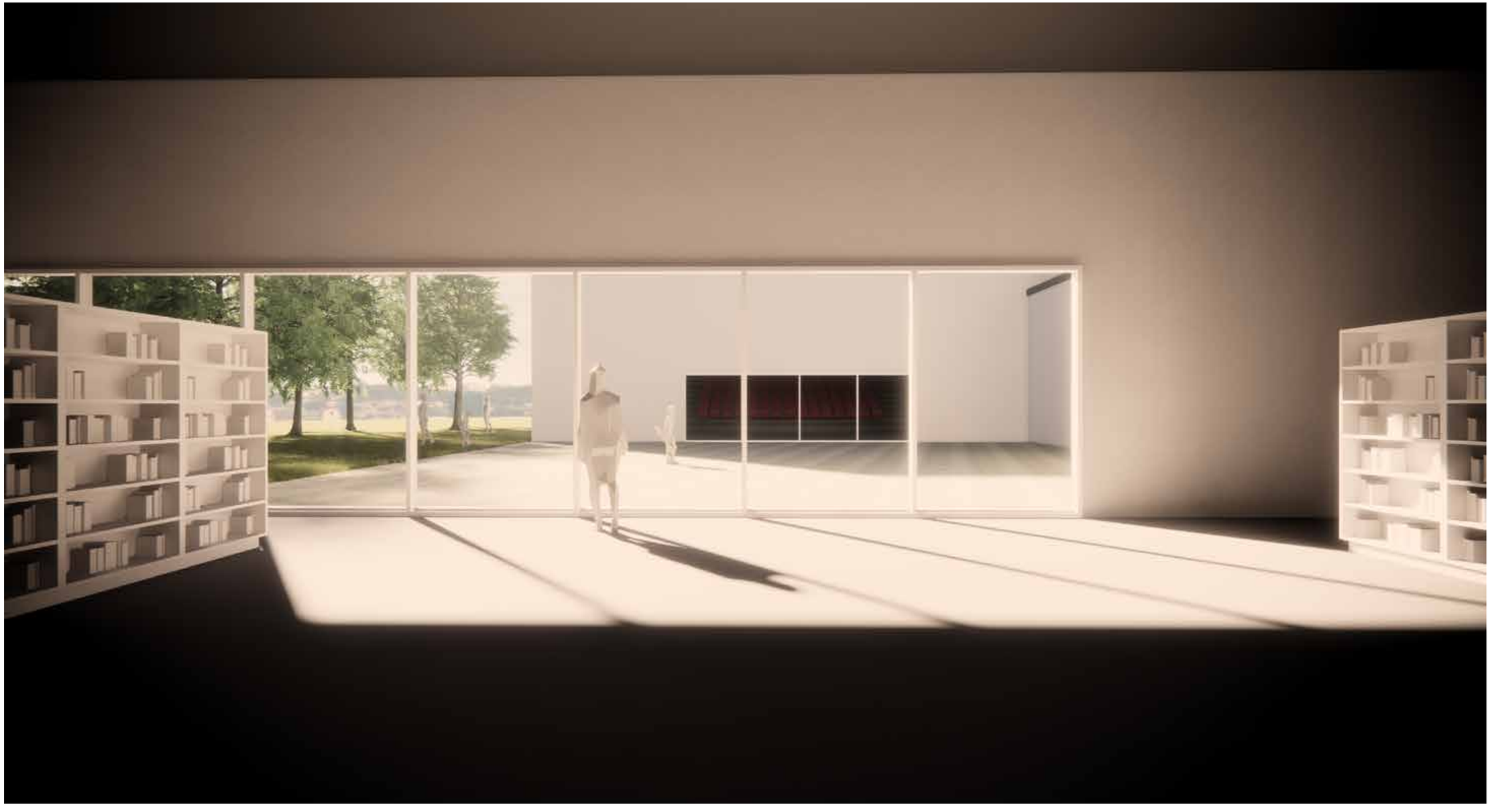
INTERIORS

VIEW INTO ARENA

4.0 Building Design

4.1 Architectural Design

INTERIORS

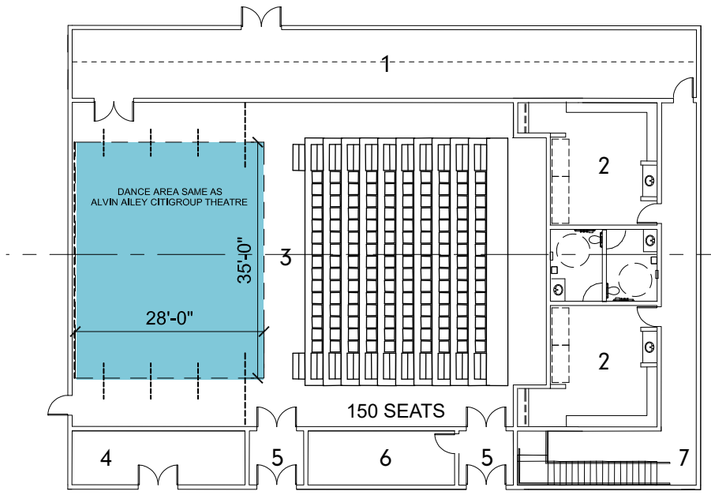


VIEW TOWARDS COURTYARD | LOOKING WEST

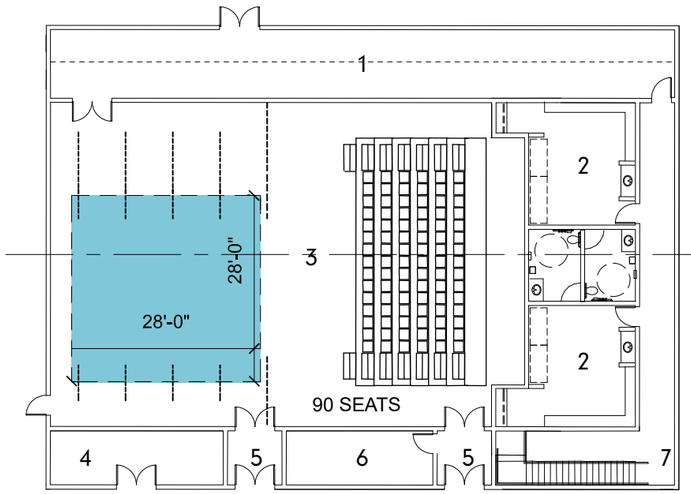
4.0 Building Design

4.1 Architectural Design

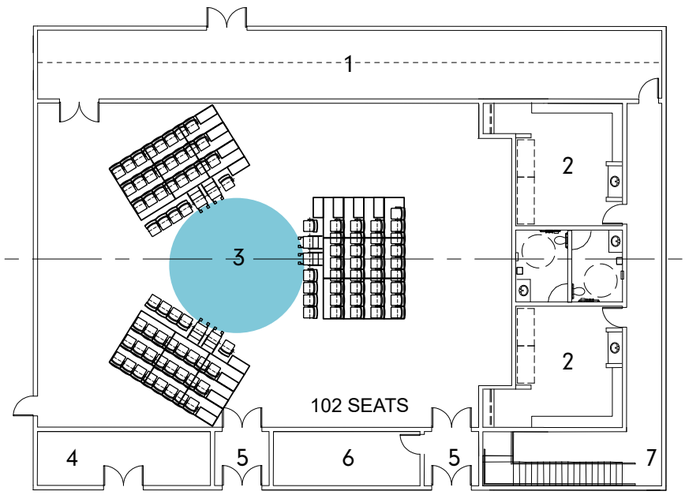
TYPICAL THEATRE CONFIGURATION



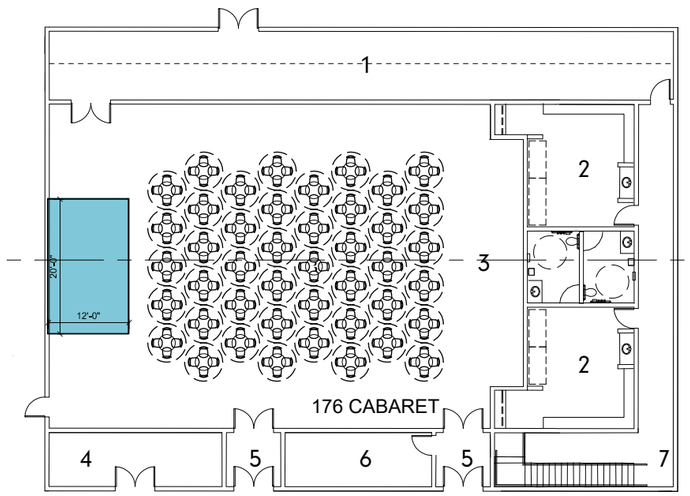
THEATRE SEATING | 150 SEATS



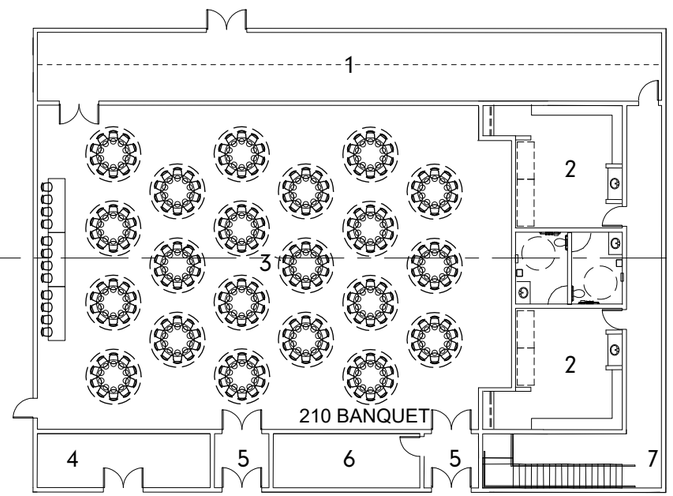
THEATRE SEATING | 90 SEATS



THEATRE IN THE ROUND | 102 SEATS



CABARET | 176 PEOPLE



BANQUET | 210 PEOPLE

1 Storage & Staging
2 Dressing Room
3 Theatre
4 Storage
5 Vestibule
6 Theatre Office
7 Storage & Sound Control Access

4.0 Building Design

4.1 Architectural Design

EVENT BOWL ANALYSIS

The spectator arena has been designed for both ice and community events.

Ice Event indicates the maximum occupant load for the spectator bowl and event spaces.

Minor Event notes the maximum occupant load for the spectator arena during a minor event taking place on the ice rink and the spectator bowl.

The spectator arena event level has not been designed for any increased live loads to accomodate vehicles driving on the refrigerated slab. A center-hung score clock will be provided. Washrooms are provided both on the main and second floor concourse to accommodate the occupant loads noted above.

Exiting for events on the main floor will occur through the vomitories on the southeast corner and the north end of the area. Temporary steps up from the main floor into the spectator bleachers will be required for exiting during a event.

SPECTATOR HOCKEY EVENT		
LEVEL	LOCATION	OCCUPANT LOAD
1	Main Floor - Ice	0
2	Specator Bowl	1,432
2	Event Space 1	12
3	Event Space 2	59
	Total Occupant Load	**1,503**

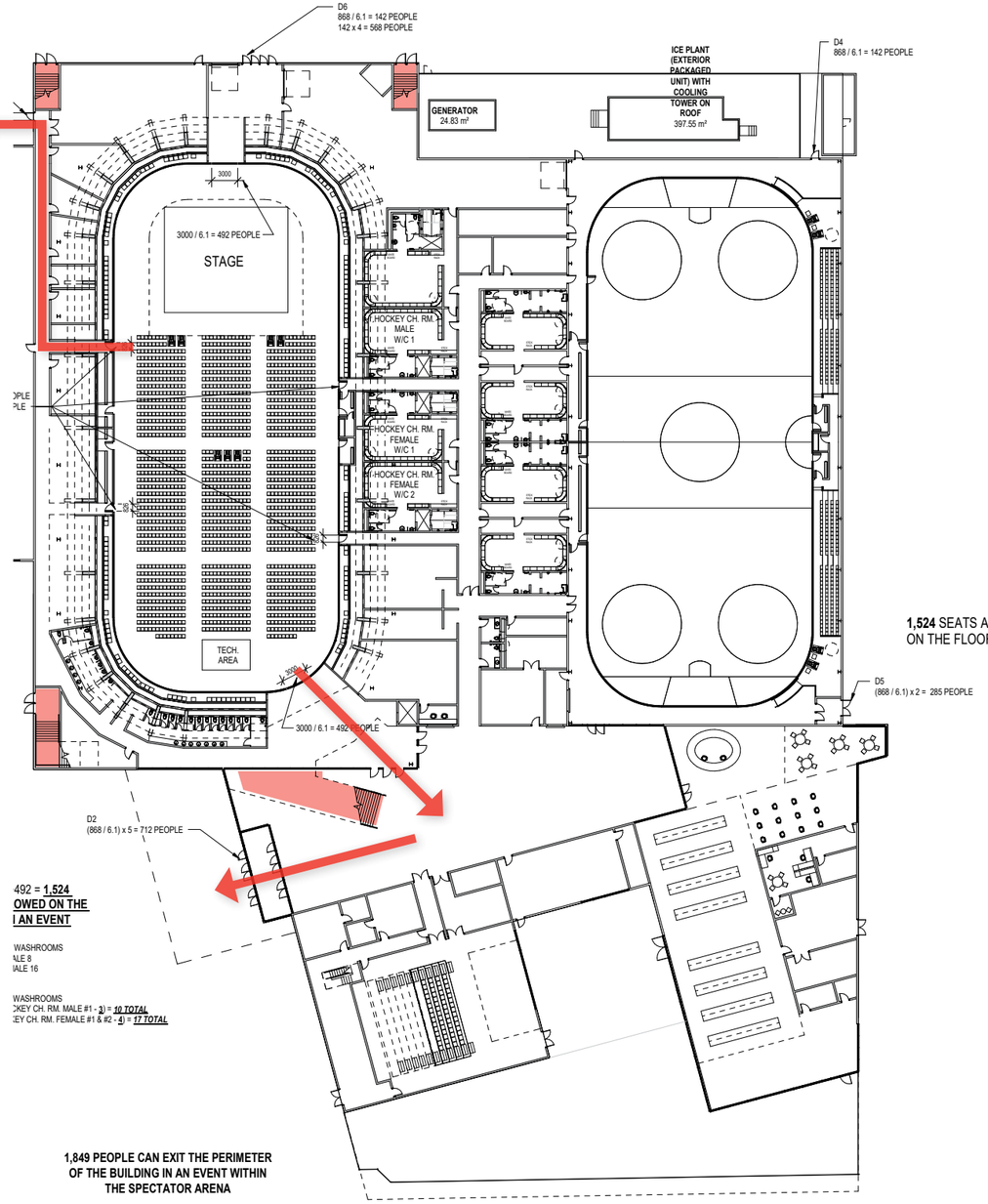
MINOR EVENT (FLOOR & ICE)		
LEVEL	LOCATION	OCCUPANT LOAD
1	Main Floor - Ice	1,524
2	Specator Bowl	853
2	Event Space 1	12
3	Event Space 2	0
	Total Occupant Load	**2,389**

MINOR EVENT (FLOOR ONLY)		
LEVEL	LOCATION	OCCUPANT LOAD
1	Main Floor - Ice	1,524
2	Specator Bowl	0
2	Event Space 1	0
3	Event Space 2	0
	Total Occupant Load	**1,524**

4.0 Building Design

4.1 Architectural Design

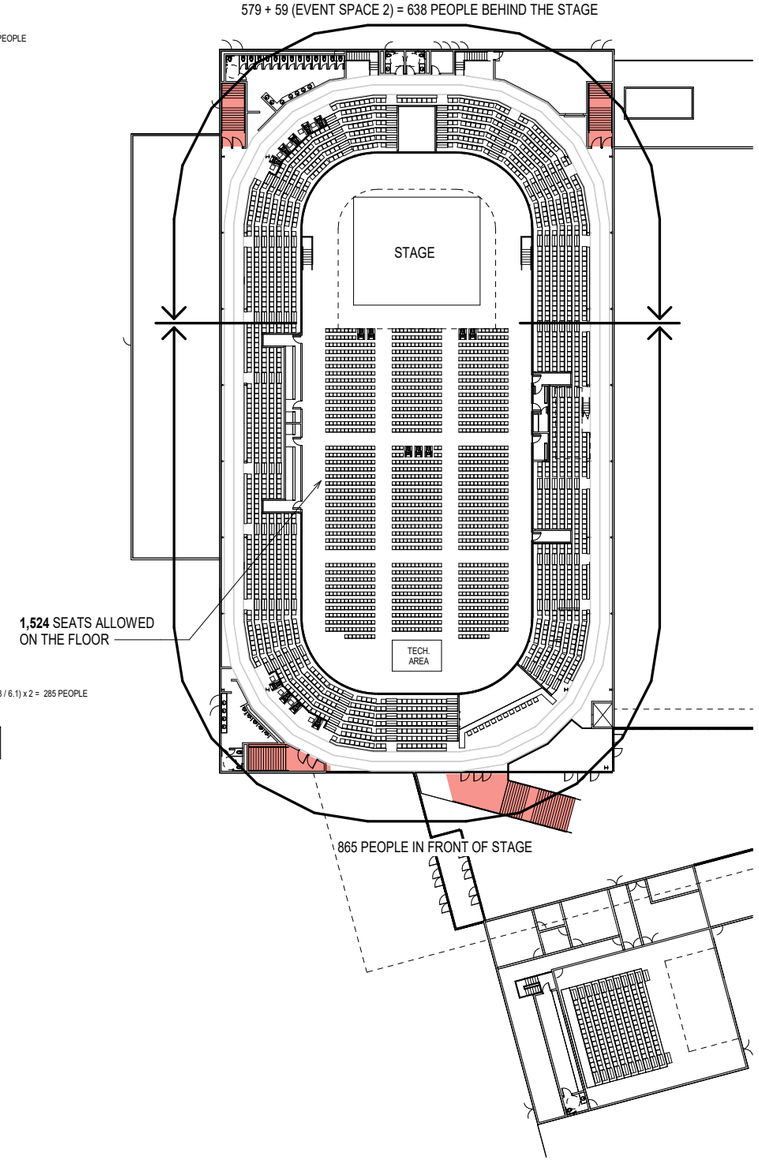
EVENT BOWL ANALYSIS



Exit Direction

Exits

MAIN FLOOR



1,524 + 865 = 2,389 TOTAL SEATS IN AN EVENT

REQUIRED WASHROOMS	PROVIDED WASHROOMS
MALE 10	MALE (8 on LVL 2) + (7 on LVL 1) = 15 TOTAL
FEMALE 20	FEMALE (15 on LVL 2) + (13 on LVL 1) = 28 TOTAL

CONCOURSE LEVEL

4.0 Building Design

4.1 Architectural Design

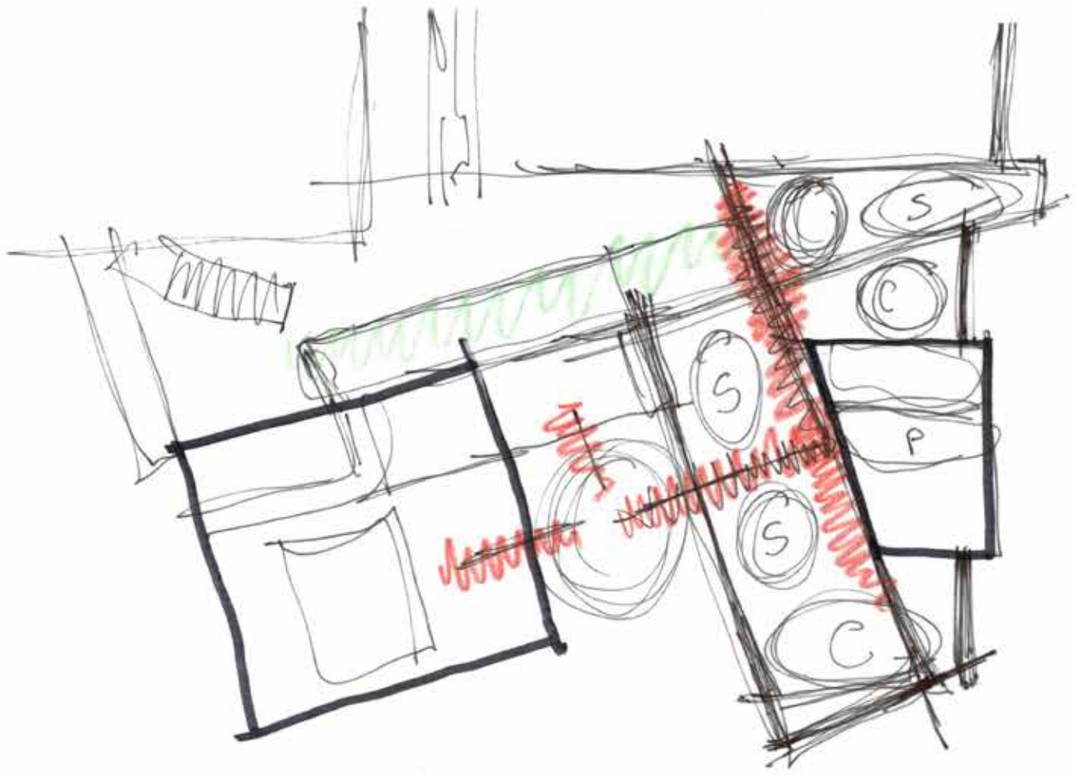
ACCESSIBILITY & UNIVERSAL DESIGN

The Spruce Grove Civic Centre will be designed as a universally accessible facility. Creating an environment of inclusivity and universal accessibility and eliminating barriers—both physical and perceived—allows for the free movement of people, reducing the potential to marginalize and segregate people based on demographic or physical ability, something GEC would like to address in the Civic Centre.

It is GEC's understanding the City of Spruce does not have an accessibility policy. To ensure the highest standards of universal design are being met, GEC will be reviewing the design in regards to Alberta Building Code Section 3.8 (Barrier-Free Design) and CAN/CSA B651-18 Accessible Built Environment Standard (CSAB651) and/or the City of Edmonton Access Design Guide. The team will also review the design beyond simple code compliance to prioritize convenience, safety, dignity, and inclusion for all users.

Some of the accessible and universal design features within this multi-use facility include:

- Provide inclusive designated seating in the spectator and community arena viewing areas.
- Include family/universal washrooms on the main and second floor of the building, including the art gallery and library.
- Include accessible dressing rooms, including accessible showers.
- Include an elevator to provide accessible means of access between floors.
- Eliminate interior stairs and ramps, apart from the stairs between floors, since these can pose a challenge to mobility impaired users.
- Design and grade the building site so that public entrances do not require exterior stairs or ramps.
- While every attempt will be made to eliminate barriers, some are obviously required for reasons of privacy, acoustics, fire-separation, etc. Therefore, it was important to design doors and corridors with widths exceeding building code requirements and with ample automatic openers, given that many users rely on wheelchairs or walking devices.
- Employ CPTED principals to improve public safety and environmental design will all be integrated to provide a great public space.



SKETCH OF CULTURAL & COMMUNITY SPACE

4.0 Building Design

4.1 Architectural Design

CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED)

Crime Prevention Through Environmental Design (CPTED) is a multi-disciplinary approach of crime prevention that uses urban and architectural design and the management of built and natural environments. CPTED strategies aim to reduce victimization, deter offender decisions that precede criminal acts, and build a sense of community among inhabitants so they can gain territorial control of areas, reduce crime, and minimize fear of crime.

Some of the CPTED strategies we will implement in the design to make the neighborhood, community and site safer will be as follows:

- Providing appropriate lighting for streets, paths, alleys and parks.
- Maximize sightlines in and out of public spaces.
- Encourage use of public spaces by ensuring they are programmed and well-designed.
- Through design encourage a strong sense of community in both interior and exterior spaces.

Some of the CPTED strategies we will implement in the design to improve safety for the occupants and operators within the building will be as follows:

- Installing and providing CCTV cameras in select locations.
- Limiting the amount of corners and alcoves around the building.
- Provide unobstructed views throughout the facility where possible.
- Install access control and higher quality hardware on doors to all non-public spaces.
- Ensuring all public spaces are well lit.
- Providing common space within the building to promote community interaction.

SKETCH OF CULTURAL SPACES

4.2 Building Systems

Early consultation with structural, mechanical, refrigeration, electrical, consultants was necessary to determine systems and strategies for achieving design, phasing, and sustainability objectives. Schematic design reports from each specialty consultant are appended to this report.

4.2.1 STRUCTURAL

With the information available at this time a structural schematic design brief has been produced for both the Civic Centre and Transit Centre.

Refer to Appendix C for additional information.

4.2.2 MECHANICAL

The basis of design includes information from industry best practices. Where we have a recommendation for a different strategy or improvement, we have identified the options and have noted the differences for the user group consideration. Options will be explored further through the design development stage with the design and construction team with consideration of overall mechanical design efficiency, ease of operations, energy optimization and greenhouse gas reduction.

The facility will consist of two ice arenas (one with capacity for 1400 spectators for major events and one community arena), multi-purpose spaces, library, theatre, gathering spaces, and dressing rooms. The mechanical systems will generally be housed outdoors with easy roof or grade access indoors for services. The indoor mechanical space will be at grade near the arena Zamboni area and house the hot water heating, domestic hot water and Zamboni Flood water heating plants. A/V, and display systems designed to suit the Owner's needs and requirements.

The project has a stand alone Transit Centre that will function in conjunction with the overall transit strategy to site. Mechanically the facility operates independently of the main facility in terms of both servicing and mechanical systems.

Refer to Appendix D for additional information.

4.2.3 REFRIGERATION

The City of Spruce Grove plans to construct a new Civic Centre, which will include two NHL sized ice surfaces. The proposed refrigeration system is a low charge ammonia system packaged in a standalone, skid-mounted building that meets CSA B-52 Class T requirements. The package will be installed adjacent to the main building. The proposed system will have the required capacity to allow both arenas to operate year round and will provide optimal ice conditions in high outside ambient conditions. Ethylene glycol will be used as the secondary refrigerant, which will be circulated through a polyfusion welded, HDPE piping system within the refrigerated concrete slabs. The headers for each arena will be cast into the refrigerated slab, reducing maintenance and operation requirements of a header trench.

The proposed system will use energy efficient compressors, plate and frame heat exchangers, adiabatic fluid cooler, VFDs, and controls to maximize the efficiency of the system. Ammonia is up to 30% more efficient that alternative refrigerants, is a natural refrigerant with no ozone depleting or greenhouse gas effects, and is easily detectable by smell (self alarming) at low concentrations. Having the refrigeration plant installed in a separate building provides an additional layer of separation between the building users and the ammonia.

Refer to Appendix E for additional information.

4.2.4 ELECTRICAL

The design for the Spruce Grove Civic Centre will be done in accordance with the various local standards and codes, and based upon energy efficient design best practices. The electrical design for the building includes, but is not limited to, the following: Power distribution design and branch circuitry, lighting design and control, and auxiliary systems design.

Lighting throughout the building will be designed to provide a warm and inviting atmosphere while accenting and enhancing architectural features and all meeting Owner requirements. Light sources throughout the facility are expected to be LED, which will work in conjunction with the BMS and low voltage lighting control systems (including various daylighting and occupancy sensors) so as to reduce unnecessary energy consumption as much as possible. The power distribution throughout the facility will be done primarily with 600V to reduce line losses and decrease conductor sizes. An exterior diesel-powered backup generator is proposed to be installed to service mechanical loads along with any Owner-specified loads.

Communication rooms will be located strategically throughout the building in order to limit wire distance to the end devices. A fibre backbone will be provided as a distribution medium for the building IT infrastructure, while the general communication cabling will be CAT6.The security system will be designed with a high amount of Owner input, and is anticipated to be comprised of intrusion detection, card access system, and CCTV cameras. Select areas will have sound, A/V, and display systems designed to suit the Owner's needs and requirements.

Refer to Appendix F for additional information.

4.0 Building Design

4.3 Sustainability

GREEN BUILDING

The City of Spruce Grove has a Green Building policy. The policy demonstrates the city's commitment to sustainable development, environmental stewardship, cost savings to taxpayers through reduced operating costs, and a healthy work environment for staff and visitors. Any new building construction for a municipally-owned building in Spruce Grove should follow the Green Building policy. *This includes:*

- Incorporating Green Building principles and practices into the planning, design, construction, management, and operations of the city-owned building.
- Adoption of either the LEED® Building Rating System as the Green Building Design Standard of choice (LEED® Silver encouraged). If LEED® cannot be achieved Green Globes will can adopted (a minimum standard of one globe is required and three is encouraged).

The building will be designed to optimize natural daylighting, including to central areas of the building by means of clerestory glazing and double height spaces. High performance glazing will be used to reduce heating and cooling requirements, depending on the season. Shading systems and opportunities for natural ventilation will be further explored in the design development phase.

Building system energy consumption will be reduced in various ways as noted in the Building Systems section and in the appended consultant reports.

Where possible, materials with low carbon footprints, low VOC, and local and regional materials will be chosen. Plantings will be chosen and landscaping designed to reduce irrigation requirements and reduce surface water runoff.

ENERGY MODELLING

An energy modelling analysis will be completed to determine compliance with NECB 2017, as required for all new construction buildings in Alberta.

"A parametric analysis will be completed to analyze key parameters that will impact the energy performance of the facility. This exercise will be coordinated with costing. A collaborative workshop will be used to communicate results and ensure the project is on track to meet the energy performance targets.

Key aspects of building energy performance for the Spruce Grove Community Centre will be:

- Low temperature hot water heating with condensing boilers
- High efficiency ventilation energy recovery
- High performing building envelope
- HRVs for locker room exhaust. "

A

APPENDIX

A Appendix

Appendix A Functional Program

PROGRAM BREAKDOWN

SPECTATOR & COMMUNITY RINK

SPECTATOR ARENA	MEASURED m²	MEASURED ft²
Spectator Seating (2 Rows)	334	3594
Spectator Ice Rink (25' x 200')	1,525	16,409
Accessible Viewing Area (Main Floor)	129	1,387
Change Room 1 (22-24 Players)	85	915
Change Room 2 (22-24 Players)	85	915
Change Room 3 (22-24 Players)	85	915
Change Room 4 (22-24 Players)	85	915
Referee Change Room (Spectator Arena)	35	377
Concession (Main Floor)	65	699
Men's Public Washroom	45	484
Women's Public Washroom	45	484
Family Washroom 1	6	65
Family Washroom 2	6	65
Entrance Vestibule	10	108
Storage (Tool Room) / Workshop	21	226
Saints Dressing Room & Training Room*	467	5,025
Exit Stair 1 - Spectator Arena	52	560
Exit Stair 2 - Spectator Arena	60	646
Exit Stair 3 - Spectator Arena	60	646
Exit Stair 4 - Spectator Arena / Lobby Stair		
Circulation (Left)	294	1,000
Circulation (Right)	278	2,400
Shared Lobby - Cultural, Spectator & Community	550	5,918
TOTAL SPECTATOR ARENA (MAIN FLOOR)	**4,322 m²**	**43,749 ft²**

COMMUNITY ARENA	MEASURED m²	MEASURED ft²
Community Ice Rink (25' x 200')	1,525	16,409
Spectator Seating (250 Seats)	129	1,390
Accessible Seating	44	469
Circulation around Community Rink	445	4,790
Storage Room	19	204
Change Room 5 (22-24 Players)	85	915
Change Room 6 (22-24 Players)	85	915
Change Room 7 (22-24 Players)	85	915
Change Room 8 (22-24 Players)	85	915
Referee Change Room (Community Arena)	35	377
Skate Proshop	14	151
Vestibule	15	161
TOTAL COMMUNITY ARENA	2,566	27,610
TOTAL COMMUNITY ARENA WITH BUILDING SUPPORT	10	108
TOTAL COMMUNITY ARENA WITH 10% GROSS-UP	258	2,772
TOTAL COMMUNITY ARENA	2,834	30,489
TOTAL SPECTATOR ARENA	**5,801 m²**	**62,414 ft²**
TOTAL COMMUNITY ARENA	**2,566 m²**	**27,610 ft²**
TOTAL COMMUNITY & SPECTATOR ARENAS (EXCLUDING SUPPORT SPACE)	**8,367 m²**	**90,024 ft²**

*No further program breakdowns have been provided by the Saints.

PROGRAM BREAKDOWN

CULTURAL & COMMUNITY

LIBRARY	MEASURED m²	MEASURED ft²
Office (1 person) Open Office Space (3-4 people) Work / Copy Room	63	680
Welcome Counter Service Counter / Circulation Desk Books / Stacks	444	4,779
Children's Corner	116	1,248
Storage Space (non-public)	29	312
Custodial and Electrical Room	15	161
Program Room	0	0
Staff Break Area / Quiet Staff Retreat (Quiet Room)	5	55
Public Computer Area	88	942
Meeting Room	0	0
Processing Room	58	626
General Study / Meeting Area / Seating Lounge & Tables	58	626
Outdoor reading space	0	0
Accessible Family / Public Washroom	5	54
TOTAL LIBRARY SPACE	**881 m²**	**9,483 ft²**

VISUAL ARTS	MEASURED m²	MEASURED ft²
Display Space / Galley Reception / Store	98	1,066
Office & Support Space	15	161
Program Room (Art Classes)	45	487
Storage Room	23	251
Stage	0	0
Public Washroom (Programming Room)	0	0
TOTAL VISUAL ARTS SPACE	**181 m²**	**1,965 ft²**

PERFORMING ARTS	MEASURED m²	MEASURED ft²
Performing Area - Stage Performing Area - Circulation Seating	360	3,877
Sound Room (Control Room) and Washroom	46	495
Storage Room	65	700
Box Office	0	0
Dressing Room	56	602
Technology Room	0	0
2 Washroom - Universal	14	151
Vestibule 1	8	86
Vestibule 2	8	86
Theatre Office	14	151
Staging Area	45	484
TOTAL PERFORMING ARTS SPACE	**616 m²**	**6,632 ft²**

PROGRAM BREAKDOWN

BUILDING SUPPORT SPACE

BUILDING SUPPORT SPACE	MEASURED m^2	MEASURED ft^2
Cultural / Civic Staff Room	93	997
Electrical Room 2 - Cultural	5	52
Mechanical Room - Cultural	-	-
Custodial 4 - Cultural Space	10	108
Men's Public Washroom - Cultural & Community Arena	75	807
Women's Public Washroom - Cultural & Community Arena	75	807
Family Washroom 1 - Cultural & Community Arena	5	54
Family Washroom 2 - Cultural & Community Arena	5	54
Arena Operations Office & Staff Room	12	128
Zamboni / Loading	213	2,292
Ice Plant Room	-	-
Water Service Room	8	82
Main Electrical Room	38	409
Generator Room	10	108
Elevator Machine Room	10	108
Mechanical Room - Spectator Arena	-	-
Fluid Cooling	-	-
Custodial 1 - Spectator Arena (Main Floor)	10	108
Custodial 2 - Spectator Arena (Concourse)	10	108
Shared Lobby - Cultural, Spectator & Community	-	-
Boiler Room / Domestic Hot Water - Mechanical	150	1,614
Mechanical Room - Community Arena	-	-
Custodial 3 - Community Arena	10	108
TOTAL BUILDING SUPPORT AREA	**738 m^2**	**7,941 ft^2**
TOTAL BUILDING SUPPORT AREA - CULTURAL ONLY	**267 m^2**	**2,878 ft^2**
TOTAL BUILDING SUPPORT AREA - SPECTATOR AREA	**461 m^2**	**4,955 ft^2**
TOTAL BUILDING SUPPORT AREA - COMMUNITY ARENA	**10 m^2**	**108 ft^2**

PROGRAM BREAKDOWN

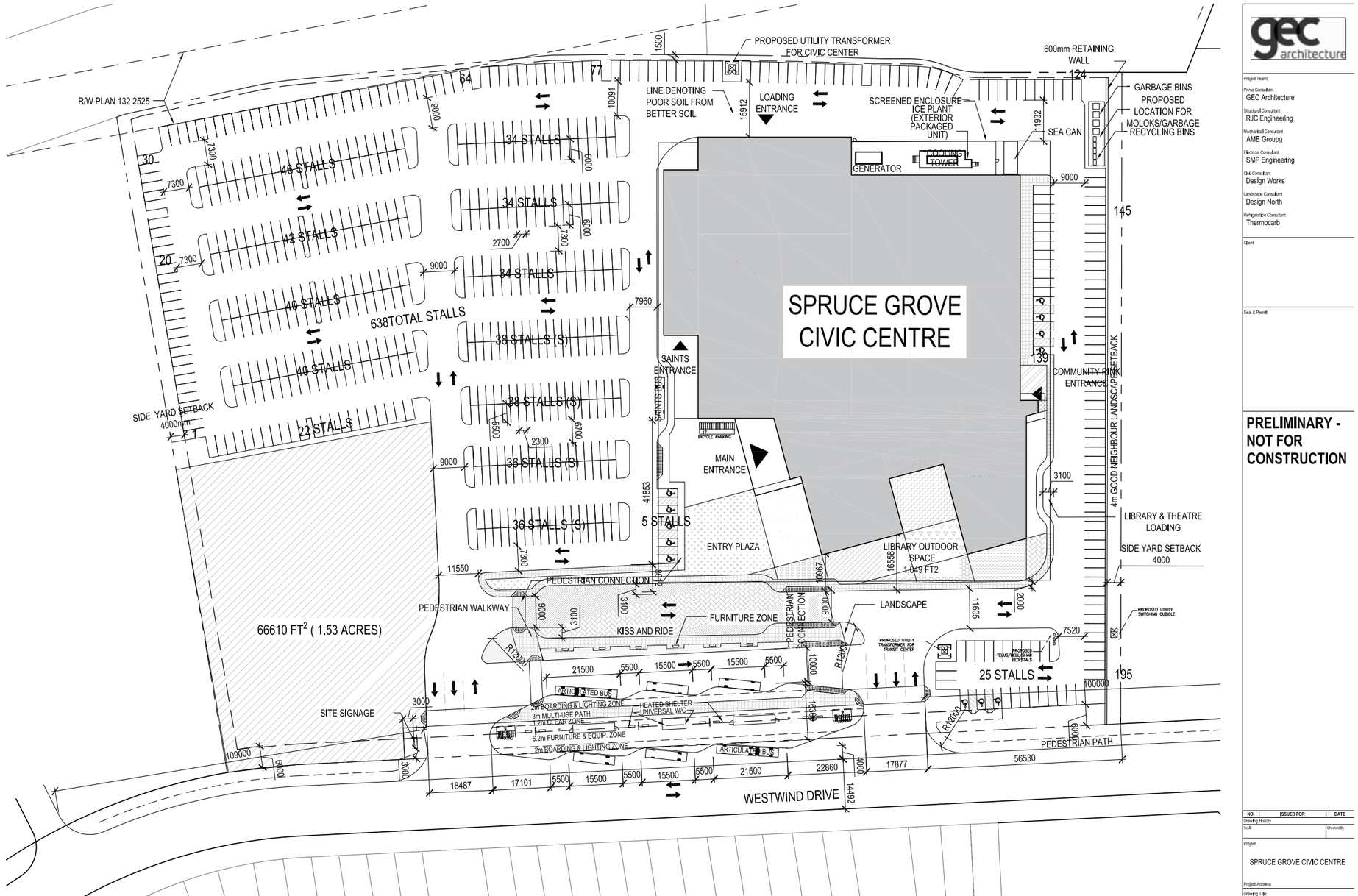
TOTAL SUMMARY

SPECTATOR & COMMUNITY ARENA	MEASURED m^2	MEASURED ft^2
Spectator Arena (including Saints)	5,333	57,389
Community Arena	2,565	27,610
Building Support - Spectator Arena	460	4,955
Building Support - Community Arena	10	108
Saints	467	5025
TOTAL SPECTATOR & COMMUNITY ARENA	**8,837 m^2**	**95,087 ft^2**

CULTURAL SPACES	MEASURED m^2	MEASURED ft^2
Building Support - Cultural	267	2,878
Library	848	9,122
Visual Arts	186	2,000
Black Box Theatre (main and second floor)	665	7,155
Multi-Purpose Room	-	-
TOTAL CULTURAL SPACE	**1,966 m^2**	**21,155 ft^2**

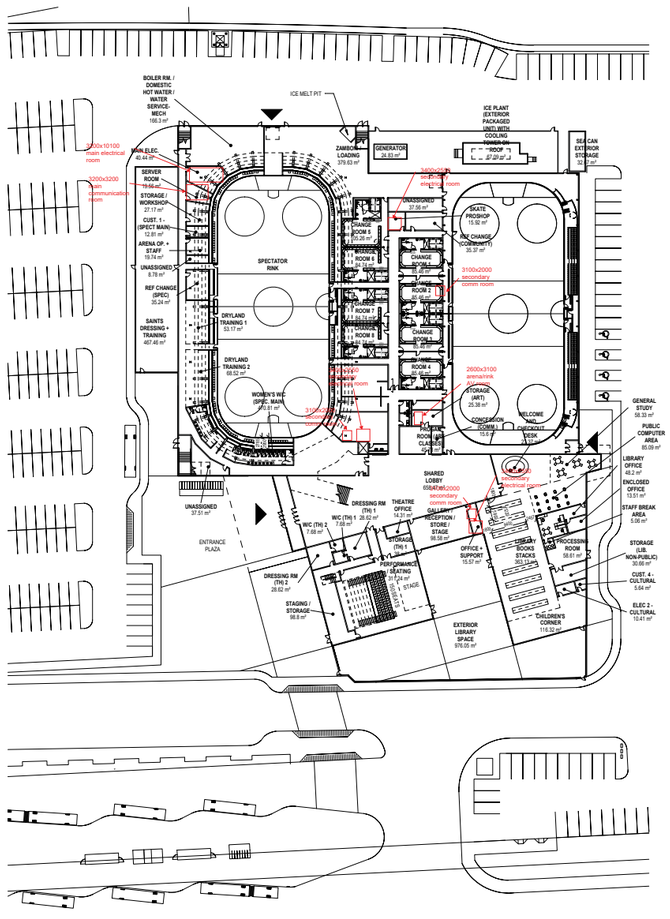
SUMMARY	MEASURED m^2	MEASURED ft^2
NEW NET FLOOR AREA	**10,803 m^2**	**116,242 ft^2**
NET FLOOR AREA WITHOUT CULTURAL	**8,837 m^2**	**95,087 ft^2**
10% GROSS UP	**884 m^2**	**9,509 ft^2**
GROSS FLOOR AREA	**11,687 m^2**	**125,751 ft^2**

Appendix B Architectural Drawings

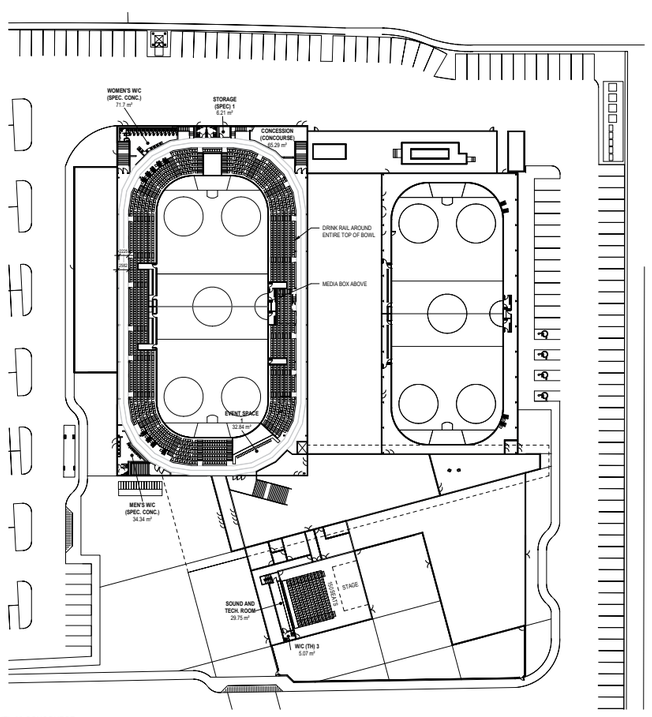


A Appendix

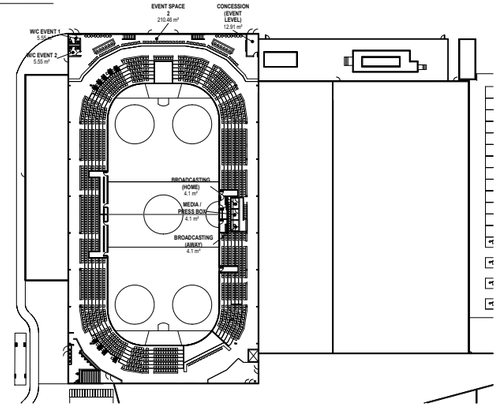
Appendix B Architectural Drawings



3 A061 OPTION 26 -COMPOSITE- LEVEL 01
Scale: 1 : 400



2 A061 OPTION 26 -COMPOSITE- LEVEL 02 CONCOURSE
Scale: 1 : 400



1 A061 OPTION 26 -COMPOSITE- LEVEL 03 EVENT SPACE
Scale: 1 : 400

	OPTION 24 WITH DRINK RAIL
SEATS	- 1,414 BLEACHER SEATS - 9 ACCESSIBLE SEATS - 9 COMPANION SEATS EVENT SPACE 1 - 12 PEOPLE AT LOW LOGE SEATING EVENT SPACE 2 - 47 PEOPLE AT LOW LOGE SEATING - 12 PEOPLE AT STANDING RAIL **1,503 TOTAL NUMBER OF SEATS**

OPTION 26 - GROSS FLOOR AREA

Name	Area	Area Sqft
OPTION 26 - LEVEL 1 GFA	9710.12 m²	104518.89 ft²
OPTION 26 - LEVEL 2 GFA - SPEC.	1980.15 m²	21314.19 ft²
OPTION 26 - LEVEL 2 GFA - THEATRE	51.11 m²	550.17 ft²
OPTION 26 - LEVEL 3 - EVENT SPACE	262.69 m²	2719.88 ft²
OPTION 26 - LEVEL 3 - MEDIA BOX	29.73 m²	320.03 ft²
Grand total: 5	12023.81 m²	129423.16 ft²

gec architecture

Project Team:
Prime Consultant: GEC Architecture
Structural Consultant: RJC Engineering
Mechanical Consultant: AME Groupg
Electrical Consultant: SMP Engineering
Civil Consultant: Design Works
Landscape Consultant: Design North
Consultant Other: Thermocarb

Client: Client Name and/or Logo

Seal & Permit

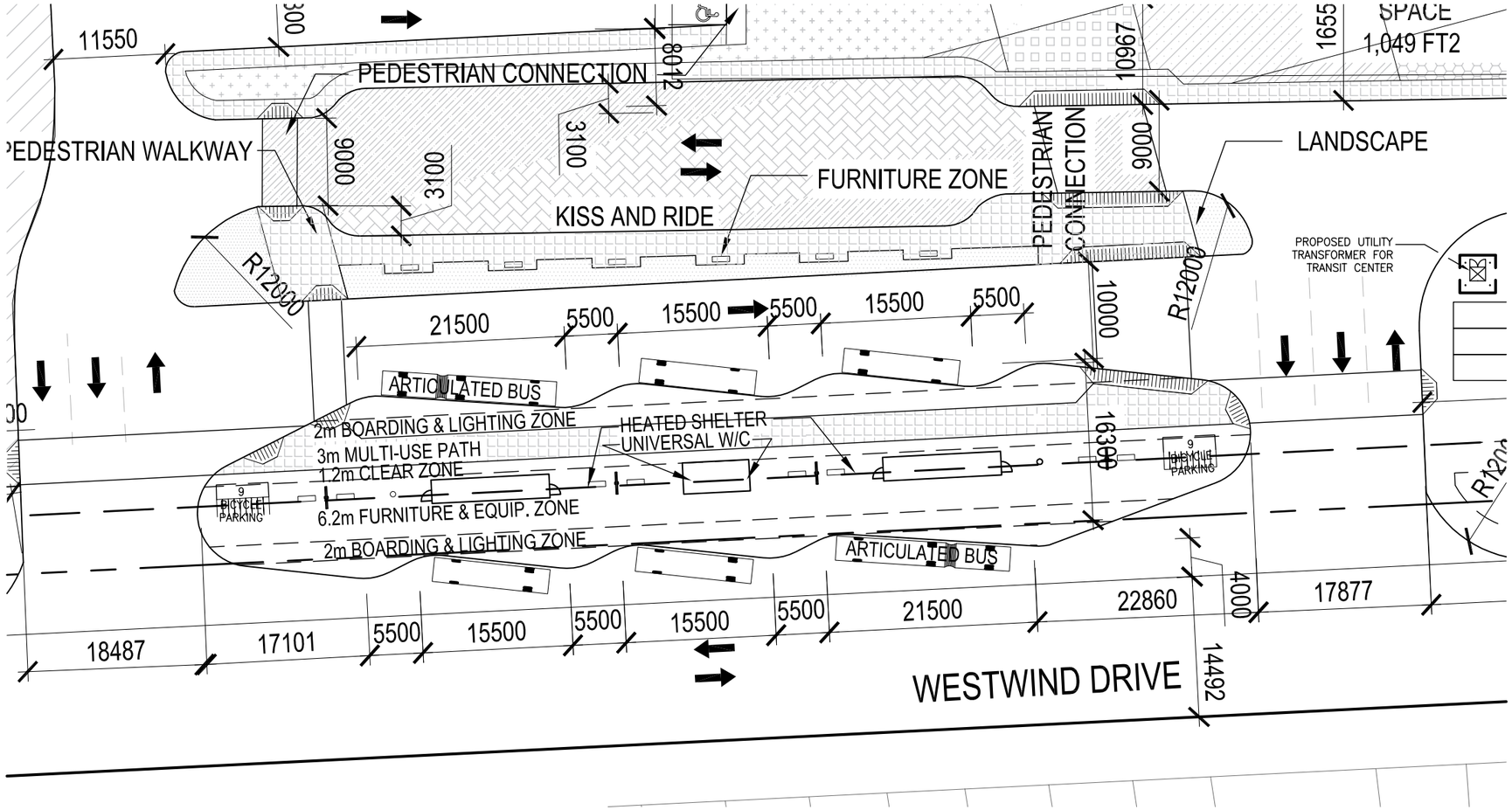
PRELIMINARY - NOT FOR CONSTRUCTION

NO.	ISSUED FOR	DATE

Drawing History
Scale: 1 : 400 | Checked By: Checker
Project: SPRUCE GROVE CIVIC CENTRE
Project Address
Drawing Title: OPTION 26
Project Number: 5855 | Drawing Number: A061

ENLARGED SITE PLAN

TRANSIT CENTRE



SCALE 1:400

gec architecture

Project Team:
Prime Consultant
GEC Architecture
Structural Consultant
RJC Engineering
Mechanical Consultant
AME Groupg
Electrical Consultant
SMP Engineering
Civil Consultant
Design Works
Landscape Consultant
Design North
Refrigeration Consultant
Thermocarb
Client
Seal & Permit

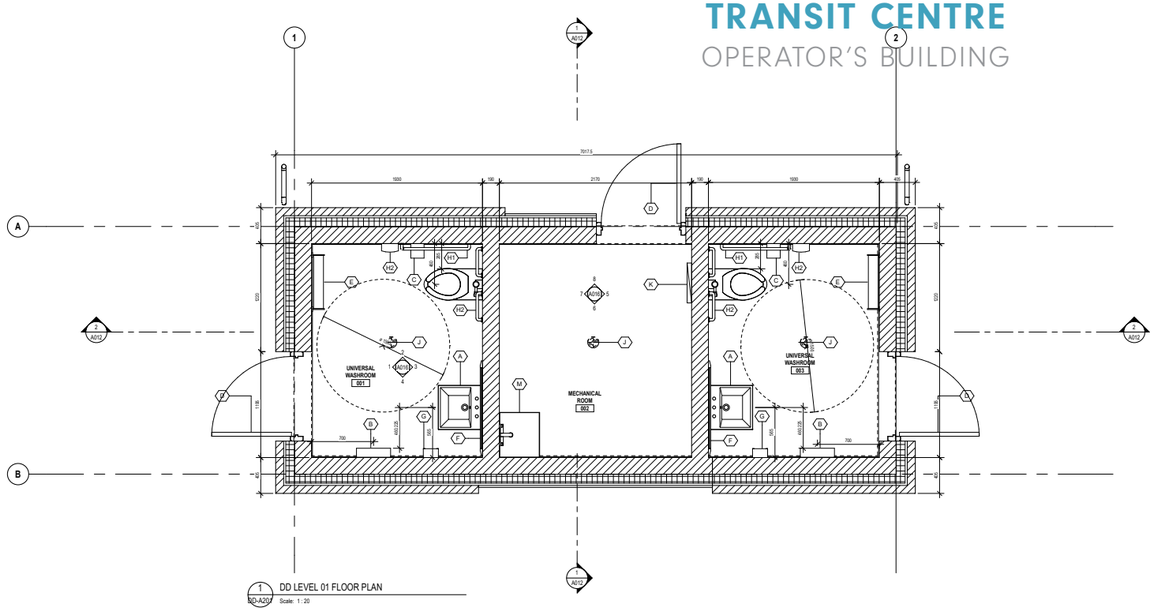
PRELIMINARY - NOT FOR CONSTRUCTION

NO.	ISSUED FOR	DATE

Drawing History
Scale
Checked By
Project
SPRUCE GROVE CIVIC CENTRE
Project Address
Drawing Title
Project Number: 5855
Drawing Number: A041

TRANSIT CENTRE

OPERATOR'S BUILDING



1 DD LEVEL 01 FLOOR PLAN
SD-A201 Scale: 1 : 20

WASHROOM ACCESSORY SCHEDULE

TYPE	DESCRIPTION
A	WASHROOM LAVATORY
B	SURFACE MOUNTED WASTE RECEPTACLE W/ PAPER TOWEL DISPENSER
C	SURFACE MOUNTED TOILET TISSUE DISPENSER (2 ROLL)
D	SURFACE MOUNTED COAT HOOK
E	SURFACE MOUNTED SHELF
F	SURFACE MOUNTED MIRROR
G	SOAP DISCENSER
H1	GRAB BAR TYPE 1 - L - SHAPE BAR
H2	GRAB BAR TYPE 2 - REGULAR BAR
I	SURFACE MOUNTED SANITARY/NAPKIN DISPOSAL
J	FLOOR DRAIN

MECHANICAL ROOM ACCESSORY SCHEDULE

TYPE	DESCRIPTION
K	ELECTRICAL POWER PANEL
M	MOP SERVICE BASIN

WASHROOM ACCESSORY NOTES

1. WASHROOM ACCESSORY MOUNTING HEIGHTS TO MEET BARRIER FREE REQUIREMENTS UNLESS NOTED OTHERWISE.
2. ALL WASHROOM ACCESSORIES TO BE INSTALLED UNDER THIS CONTRACT.
3. PLYWOOD BACKING TO BE SUPPLIED AND INSTALLED BEHIND ALL WASHROOM ACCESSORIES AND GRAB BARS AS REQUIRED.

gec architecture

Project Team:

Prime Consultant
GEC Architecture

Structural Consultant
?

Mechanical Consultant
?

Electrical Consultant
?

Civil Consultant
?

Landscape Consultant
?

Consultant Other
?

Client
Client Name and/or Logo

Seal & Permit

PRELIMINARY - NOT FOR CONSTRUCTION

NO.	ISSUED FOR	DATE

Drawing History

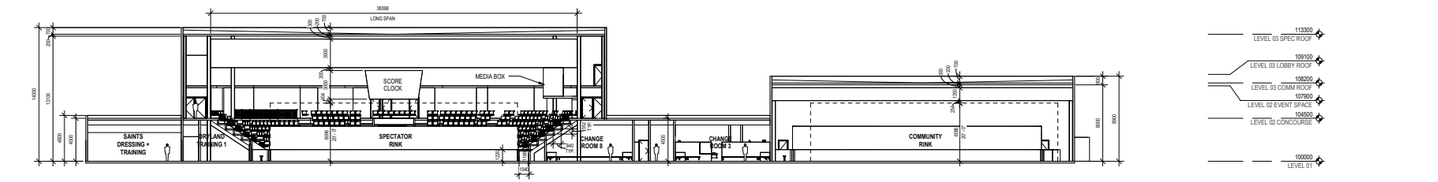
Scale: As indicated
Checked By: Checker

Project
TEMPLATE

Project Address

Drawing Title
FLOOR PLANS

Project Number: 5855
Drawing Number: **DD-A201**



3 A064 OPTION 26 - SECTION THROUGH SPEC. RINK AND COMM. RINK
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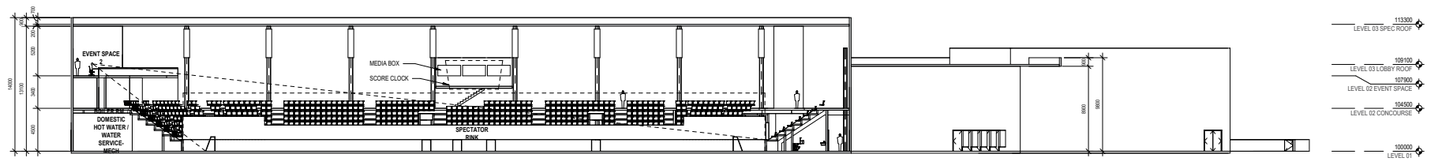

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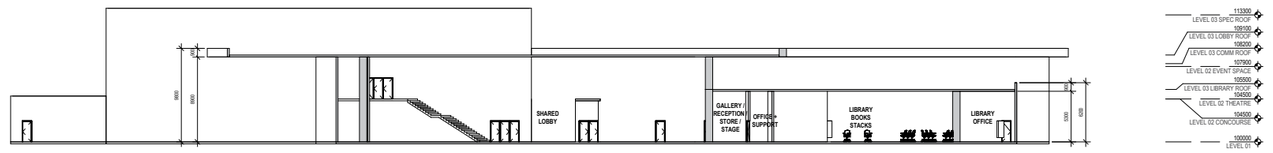

1 A064 OPTION 26 - SECTION THROUGH LOBBY AND LIBRARY
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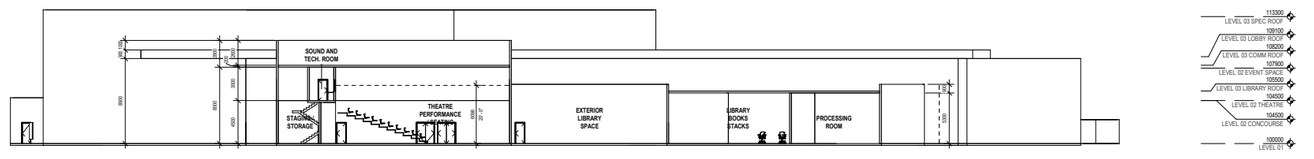


4 A064 OPTION 26 - SECTION THROUGH THEATRE AND LIBRARY
Scale: 1 : 200

gec architecture

Project Team:

Prime Consultant
GEC Architecture

Structural Consultant
RJC Engineering

Mechanical Consultant
AME Groupg

Electrical Consultant
SMP Engineering

Civil Consultant
Design Works

Landscape Consultant
Design North

Consultant Other
Thermocarb

Client
Client Name and/or Logo

Seal & Permit

PRELIMINARY - NOT FOR CONSTRUCTION

NO.	ISSUED FOR	DATE

Drawing History

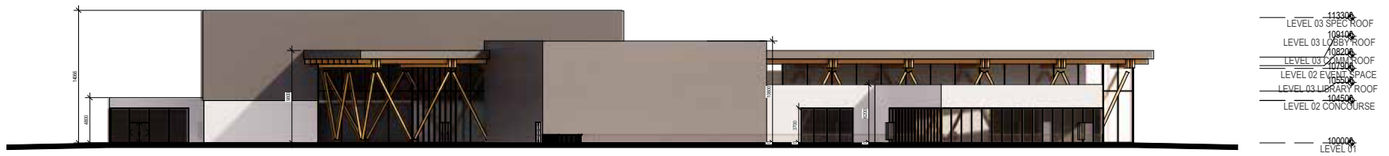
Scale: 1 : 200 | Checked by: Checker

Project
SPRUCE GROVE CIVIC CENTRE

Project Address

Drawing Title
OPTION 26 - BUILDING SECTIONS

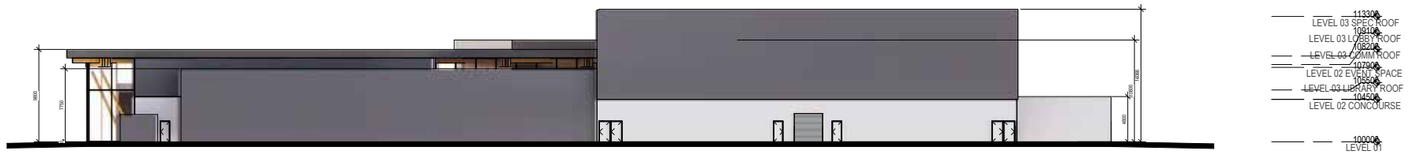
Project Number: 5855 | Drawing Number: A064



3 A065 OPTION 26 - SOUTH ELEVATION
Scale1 : 200

1 A065 OPTION 26 - EAST ELEVATION
Scale1 : 200

4 A065 OPTION 26 - WEST ELEVATION
Scale1 : 200



2 A065 OPTION 26 - NORTH ELEVATION
Scale1 : 200

gec architecture

Project Team:
Prime Consultant
GEC Architecture
Structural Consultant
RJC Engineering
Mechanical Consultant
AME Groupg
Electrical Consultant
SMP Engineering
Civil Consultant
Design Works
Landscape Consultant
Design North
Consultant Other
Thermocarb

Client
Client Name and/or Logo

Seal & Permit

PRELIMINARY
NOT FOR
CONSTRUCTI

NO.	ISSUED FOR	DATE

Drawing History
Scale 1 : 200
Checked By Checker
Project
SPRUCE GROVE CIVIC CE
Project Address
Drawing Title
OPTION 26 - ELEVATION
Project Number 5855
Drawing Number A065

Appendix C Structural Design Brief

City of Spruce Grove

Spruce Grove Civic Centre

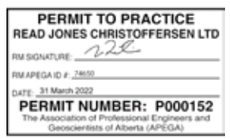
Structural Schematic Design Brief

Date: March 31, 2022

RJC Project Number. CAL.130316.0002

Prepared for:
GEC Architecture
300, 2207 – 4th Street SW
Calgary, AB | T2S 1X1

Prepared by:
Mark Ritchie, PEng., MSc, BSc
and
Frank Cavaliere, BSc, P.Eng., FEC, FGC (Hon.), LEED® AP , Parksmart Advisor
Read Jones Christoffersen Ltd.
#200, 1816 Crowchild Trail NW
Calgary, AB | T2M 3Y7



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1.0 INTRODUCTION

Read Jones Christoffersen Ltd. (RJC) has been engaged to provide the structural schematic design for the proposed City of Spruce Grove Civic Centre, with the primary purpose of estimating construction values at a schematic level (Class 4) in accordance with AACE International Recommended Practice 18R-97 (Accuracy Range – Low: -15% to -30% / High +20% to +50%). The report herein describes the primary structure at a schematic level.

2.0 DESCRIPTION OF STRUCTURAL WORK

The scope of the Civic Centre includes the following components:

.1 A new 1,850 seat NHL size arena (*Spectator Arena*)
.2 A new 500 seat NHL size arena (*Community Arena*)
.3 A new operable seat theatre (*Public Space*)
.4 A new public library (*Public Space*)

At time of our review, a geotechnical report has not been provided and will be required to confirm our foundation assumptions. Our schematic design report assumes the Civic Centre will not be used as an emergency shelter in the event of a natural disaster, and therefore the building is classified as importance category Normal.

3.0 STRUCTURAL CONSIDERATIONS

The sections below summarize the primary structural systems for the new Civic Centre, with the primary purpose of estimating construction values at a schematic design level. The structural schematic design narrative should be read in conjunction with the drawings listed in **Appendix B** as well as Architectural drawings. Note, the structural description for the Operable Seat Theatre and Public Library are henceforth defined as Public Spaces.

3.1 Foundations

For both Arenas and Public Spaces; the superstructure will be supported on cast-in-place concrete piles founded in the very stiff clay till. It should be noted that temporary pile casings will be required to advance the piles through the overlying sandy layers, where encountered above the clay layer.

Typical pile loads for the Spector Arena, Community Arena, and Public Spaces are shown on drawings **S-201, S-301, and S-302**.

As noted above, at time of our review a geotechnical report has not been provided and will be required to confirm our foundation assumptions.

3.2 Substructure (Event Level)

The lowest level (Event Level) of the Spector Arena, Community Arena, and Public Spaces require a relatively high level of slab performance with minimal slab movement. Concrete slab on grade will be founded on high plastic clays with moisture contents close to their plastic limits with a

high potential for soil swelling. To mitigate potential future slab movement, the Event Level design for the Spector Arena, Community Arena, and Public Spaces will be comprised of a 250mm thick structural cast-in-place concrete reinforced slab on grade (complete with 100mm of void form). Refer to drawings **S-201, S-301, and S-302**.

A continuous 450mm x 800mm deep reinforced cast-in-place concrete grade beam (complete with 100mm of void form), supported on piles, will follow the perimeter of the event level.

3.3 Superstructure (Concourse Level)

.1 Spectator Arena (Level - 02)

The suspended Spectator Arena concourse level will be comprised of 90mm concrete topping on 76mm composite steel deck supported by W360 beams spaced a 1900mm on centre and W530 girders, which are supported on structural steel columns spaced at 7.6m on centre. Refer to **Drawing S-301**-Option 1.

.2 Bleachers (Spectator and Community Arenas)

The bleacher system for the Spectator Arena will be pre-cast concrete supported on W610 raker beams spaced at 7.6m on centre, which are supported on cast-in-place concrete pile-caps and piles.

The bleacher system for the Community Arena will be pre-engineered aluminum bleachers, designed and supplied by the bleacher manufacturer.

3.4 Spectator Arena Roof

The Spectator Arena Roof structure will be comprised of 76mm roof deck supported by 2200mm deep open web steel joists (OWSJ) spaced at 2535mm on centre. The OWSJ span to W530 edge beams, which in-turn are supported on W360 columns spaced at 7.6m on centre. Refer to **Drawing S-301**-Option 1.

An allowance shall be made to support a roof-suspended 2,500kg score clock, located directly above the centre of rink.

3.5 Community Arena Roof

The Community Arena roof will be comprised of 1800mm deep OWSJ at 3000mm on centre supporting 76mm roof deck. The OWSJs are supported on W460 edge beams spanning between W310 columns spaced at 6m on centre. Refer to **Drawing S-302**-Option 1.

3.6 Ice Slab Assembly

The ice slab assembly for both the Spectator and Community Arenas will consist of a 150mm reinforced cast-in-place cold slab, a layer of poly slip-sheets, two layers of 50mm HI-40 rigid insulation, a leveling sand layer, and a 250mm reinforced cast-in-place concrete heated structural slab on grade supported on piles. Refer to **Drawing S-301 and S-302**.

3.7 Lateral Load Resisting System

The lateral load resisting system of the Spector Arena, Community Arena, and Public Spaces will be comprised of both steel braced frames and cast-in-place concrete stair/elevator shafts. The locations (bays) of the braced frames will be developed during the next stage of the project.

4.0 NON STRUCTURAL CONSIDERATIONS

This Schematic Design Report is intended to describe the structural systems and summarize the primary structural design criteria for the purposes of schematic design costing. The structural schematic design report should be considered in conjunction with the drawings provided. The following items should be given consideration when developing a schematic estimated budget.

Allowances must be made for secondary structure, special structures, and atypical elements consistent with this building type. Examples of such elements are as follows.

- Secondary framing for the support of cladding, louvers, screens, and glazing.
- Secondary framing for mechanical equipment and at electrical rooms.
- Secondary framing for floor and roof openings as well as sleeves for floor penetrations. Refer also to Architectural and mechanical drawings.
- Skylights, catwalks, and other miscellaneous structural steel indicated on the architectural drawings.
- Parapets and roof projections.
- Support for hanging partitions.
- Housekeeping pads, ramps, and curbs.
- Stairs, stair landings, and framing for elevators between floors.
- Exterior structures such as retaining walls, planters, walkways, curbing, and the like.
- Window washing and fall arrest requirements.

5.0 ASSUMPTIONS

The following assumptions have been made with respect to the structural schematic design:

- Construction loads will not exceed the design loads noted in this document. Adequate shoring will be provided during construction.
- Except where specifically noted otherwise, construction tolerances are as described in CSA A23.1/A23.2 for concrete construction and as per CSA S16.1 for steel construction.
- Assumed design criteria and material properties and described in **Appendix A** and **Appendix C**, respectively.

6.0 RISK ASSESSMENT

The following is a list of items in the design process, or inherent in this particular project, which may create risk to the Owner and should be reviewed in more detail to mitigate this risk. This list will be refined as the design progresses.

- The project design is not yet complete. Structural design continues to evolve in parallel with the design by other consultants and through an evolution of the program requirements. We recommend a design contingency be carried to reflect the preliminary nature of the available information.
- Based on our experience, we recommend a construction contingency be carried to cover the effect of unforeseen site conditions and unexpected construction process items, such as varying founding conditions, construction sequencing, the need for temporary bracing or shoring, etc.
- We also recommend an escalation contingency be carried to cover the effects of the escalation in construction costs from the time the cost estimate is prepared to the start of construction.

A Appendix

Appendix C Structural Design Brief

APPENDIX A – SUMMARY OF DESIGN CRITERIA

Unless otherwise noted, the design criteria for this project are summarized as follows:

A.1 DESIGN CODES AND STANDARDS

- Alberta Building Code (ABC), 2019 or National Building Code of Canada (NBC), 2015
- CSA S16 – "Design of Steel Structures"
- CSA A23.3 – "Design of Concrete Structures"
- CSA A23.1/A23.2 "Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete"
- CSA S304.1– "Design of Masonry Structures"

A.2 DESIGN LOADS – GENERAL

Design loads adhere to code requirements and are based on the intended building uses, building finishes and proposed building equipment. The importance factor for load types is based on the importance category. It is assumed the building is classified as NBC Importance category "Normal" based on its use. The resulting Importance Factors are summarized in **Table 1**.

	Importance Factor	
Load Type	**Ultimate Limit States (ULS)**	**Serviceability Limit States (SLS)**
Snow & Rain	1	0.9
Wind	1	0.75
Earthquake	1	N/A

Table 1: Building Importance Factor

A.2.1 DESIGN SUPERIMPOSED DEAD LOADS

Design superimposed dead loads (excludes structural self-weight) are based on the assumed roof and floor assemblies noted in the Architectural Report. The following specified superimposed dead loads were assumed (refer to loading key plans for loading and locations):

Event Level ..... 1.5 kPa

Concourse Level ..... 1.5 kPa

Roofs - Community Arena and Public Spaces ..... 1.5 kPa

Roof – Spectator Arena ..... 1.7 kPa

A.2.2 DESIGN LIVE LOADS

Specified uniform live loads used for design are below. Live load reduction factors are utilized to the extent as outlined by the code. (Refer to loading key plans for loading and locations)

Event Level ..... 4.8 kPa

Concourse Level ..... 4.8 kPa

Roof - Community Arena and Public Spaces ..... 1.1 kPa

Roof – Spectator Arena ..... 1.1 kPa

Specified Concentrated Load – Event Level and Concourse Level ..... 18.0 kN

Specified Concentrated Load – Spectator Arena Roof ..... 4.5 kN

Specified Concentrated Load – Community Arena Roof and Public Space Roofs ..... 1.3 kN

A.2.3 DESIGN WIND LOADS

Design wind loads are calculated as per the National Building Code (NBC), using a 1 in 50 year return wind reference velocity pressure using the climatic data for the city in which the building will be located. For this project in the City of Spruce Grove q (1/50) = 0.45 kPa.

A.2.4 DESIGN SEISMIC LOADS

Seismic design loads are calculated as per NBC based on a 2% probability of exceedance in 50 years using design data for the city in which the building will be located. For this project in the City of Edmonton: Sa (0.2) = 0.10, Sa (0.5) = 0.06, Sa (1.0) = 0.03, Sa (2.0) = 0.01 and PGA 0.04.

The seismic force resisting system (SFRS) will be conventional concrete shear walls. R_d = 1.5 and R_o = 1.3 as per NBC.

A.3 DEFLECTION CRITERIA

The structure shall be designed to minimize the effects of deflections including the effects of long-term creep in concrete. The limitations are as per CSA S16, Design of Steel Structures, for steel structures and CSA A23.3, Design of Concrete Structures, concrete structures.

Deflection Criteria Summary (Live Load)

Suspended floors Span/480

Roofs Span/180

Maximum Wind Storey Drift Height/400

Seismic Storey Drift Height/40

A Appendix

Appendix C Structural Design Brief

APPENDIX B – LIST OF STRUCTURAL DRAWINGS

DRAWING	TITLE
S-201	MAIN FLOOR PLAN
S-202	SECOND FLOOR AND ROOF PLANS
S-203	COMBINED ROOF FLOOR PLAN
S-301	SPECTATOR RINK FRAMING OPTIONS
S-302	COMMUNITY RINK FRAMING OPTIONS

APPENDIX C – STRUCTURAL MATERIALS

Unless otherwise noted, structural materials shall meet the following specifications and requirements:

C.1 STRUCTURAL STEEL AND CONCRETE REINFORCEMENT

W Sections: ..... Grade 350W CAN/CSA-G40.20/G40.21 or Grade 50 (345MPa) ASTM A992/A992M

WWF Sections: ..... Grade 350W CAN/CSA-G40.20/G40.21

Channels, Angles & Plates: ..... Grade 350W CAN/CSA-G40.20/G40.21

HSS Sections: ..... Grade 350W/ASTM A500 Class C

Steel Reinforcement for Concrete ..... CSA G30 Series (F_y = 400MPa)

Heavy Timber: Glulam Beams ..... Douglas Fir 24 D-Fir Ex

C.2 REINFORCED CONCRETE STRENGTHS

Reinforced concrete shall meet the requirements of CSA A23.1/A23.2-14 "Concrete Materials and Methods of Concrete Construction/Methods of Testing for Concrete" and shall generally adhere to the following requirements shown in **Table 2**.

Element	Concrete Strength (MPa) (f'c @ 28d)	Exposure Class
Structural Slab on Grade	35	N
Pile-Caps, Piles, and Grade Beams	35	N/F1
Pre-Cast Concrete	40	N
Concrete Topping on Metal Deck	25	N
Walls	35	N
Exterior Slab on Grade	35	C1
Pre-Cast Concrete Topping	20	N

Table 2: Reinforced Concrete Strengths

A Appendix

Appendix C Structural Design Brief

APPENDIX D – ALTERNATE FRAMING SCHEMES

Appendix D describes alternate framing schemes that are to be costed separately from the base building structure to evaluate their feasibility. Base building structure includes framing shown on **Drawings S-201, S-2-2, and S-203**, as well as framing Options 1 shown on **Drawings S-301 and S-302**. Alternate framing schemes are shown on **Drawings S-301 and S-302** and are described below.

D.1 SPECTATOR ARENA ROOF – OPTION 2 (STEEL TRUSS)

A Spectator Arena roof framing alternate includes a 2.2m deep steel truss spanning the width of the arena at an assumed spacing of 7.6m on centre (column spacing). The truss is comprised on W310 chords and diagonals and span directly to the supporting columns. The trusses support W360 purlins at truss panel points, which in-turn support 76mm steel roof deck. Refer to **Drawing S-301** – Option 2.

D.2 SPECTATOR ARENA ROOF – OPTION 3 (PRE-ENG. FRAME)

A Spectator Arena roof framing alternate includes pre-engineered steel moment frames spanning the width of the arena at an assumed spacing of 7.6m on centre (column spacing). The pre-engineered frames support Z-200 cold-formed purlins, which in-turn support a standing seam roof. In-plane roof bracing will provide the roofs lateral diaphragm. Refer to **Drawing S-301** – Option 3.

D.3 SPECTATOR ARENA ROOF – OPTION 4 (HEAVY TIMBER ROOF)

A Spectator Arena roof framing alternate includes a heavy timber queen post roof truss spanning the width of the arena at an assumed spacing of 7.6m on centre (column spacing). The heavy timber queen post roof truss is comprised of paired 315x1216 deep glulam top chord and an 89mm tension rod bottom chord. The heavy timber queen post roof truss supports 130x456 deep glulam purlins at 3m on centre, which in-turn support 76mm roof deck. Refer to **Drawing S-301** – Option 4.

D.4 SPECTATOR ARENA PRE-CAST CONCRETE CONCOURSE

An alternate pre-cast concrete concourse framing scheme is provided on **Drawing S-301** – Pre-Cast Concourse Option. With this alternate option the spectator level will be comprised of pre-cast concrete 200mm hollow-core slab with 64mm concrete topping. The hollow core slabs are supported by 457x406 pre-cast concrete beams, which in-turn are supported on pre-cast concrete columns spaced at 7.6m on centre.

The bleacher system for the Spectator Arena will be pre-cast concrete supported on 400x610 deep pre-cast rakers spaced at 7.6m on centre, which are supported on cast-in-place concrete pile-caps and piles.

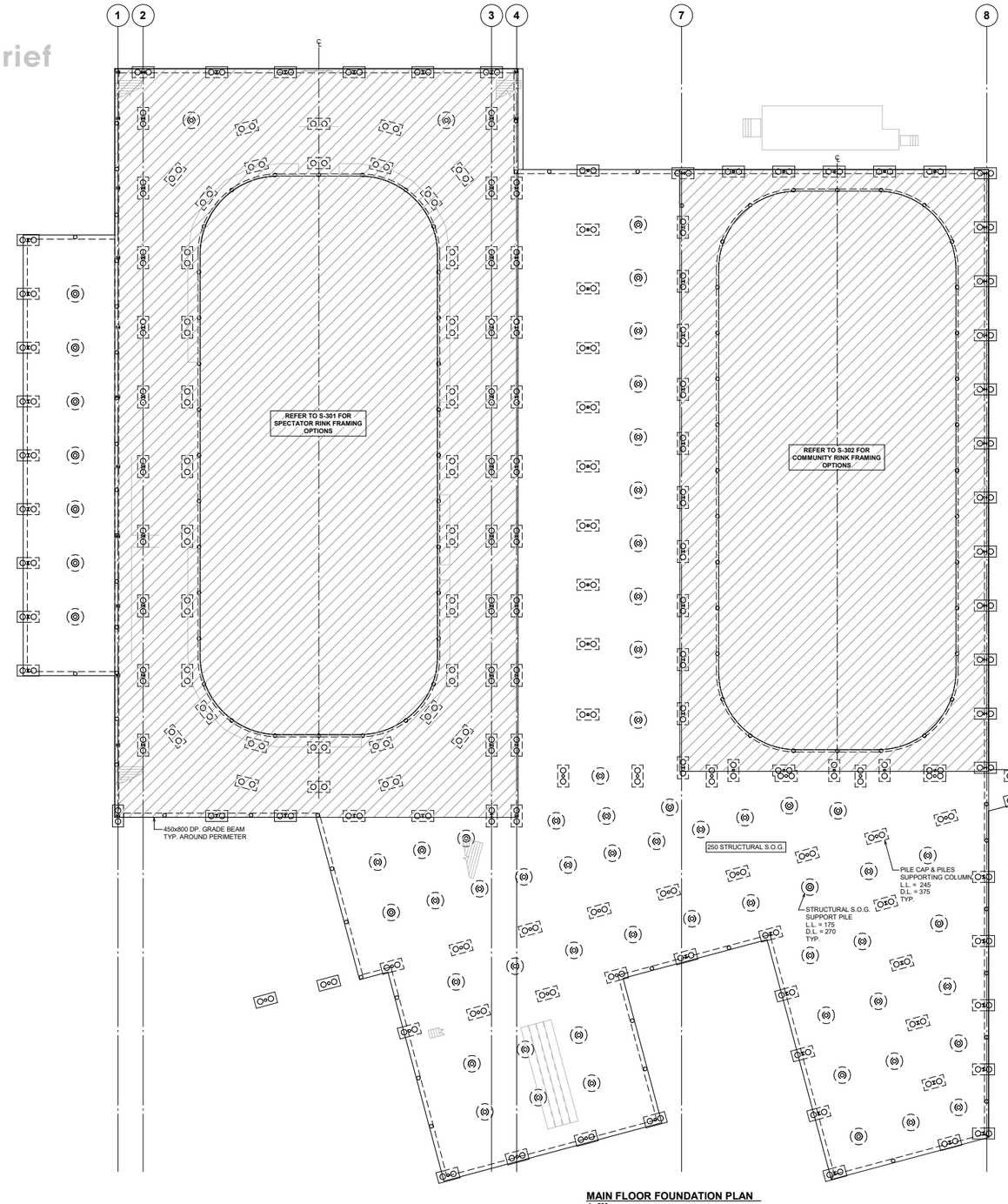
D.5 COMMUNITY ARENA ROOF – OPTION 2 (PRE-ENG. FRAME)

A Community Arena roof framing alternate includes pre-engineered steel moment frames at 6m on centre. The frames support 152mm deep Z-girts and a standing seam roof, refer to **Drawing S-302** – Option 2. In-plane roof bracing will provide the roofs lateral diaphragm.

D.6 COMMUNITY ARENA ROOF – OPTION 3 (HEAVY TIMBER)

A Community Arena roof framing alternate includes a heavy timber glulam beams spanning the width of the arena at an assumed spacing of 6m on centre (column spacing). The heavy timber glulam beams

support 130x304 deep glulam purlins at 1860mm on centre, which in-turn support 38mm roof deck. Refer to **Drawing S-302** – Option 3.



MAIN FLOOR FOUNDATION PLAN
1 : 200

NOTES:

1. CONTRACTOR TO MAKE ALLOWANCE FOR LATERAL BRACING SYSTEM - WHICH HAS YET TO BE DETERMINED. CONTRACTOR TO ASSUME COMBINATION OF STEEL BRACED FRAMES AND CONCRETE SHAFT WALLS.
2. SPECIFIED AREA LOADING
   - L1 EVENT LEVEL: LL = 4.8kPa SDL = 1.5kPa
   - CONCOURSE LEVEL: LL = 4.8kPa SDL = 1.5kPa
   - ROOFS + COMMUNITY ARENA ROOF: LL = 1.1kPa (+ PONDING + SNOW DRIFT) SDL = 1.25kPa
   - SPECTATOR ARENA ROOF: LL = 1.1kPa SDL = 1.7kPa
3. CONCRETE STRENGTHS
   - STRUCTURAL S.O.G. = 35MPa
   - PILECAPS AND PILES = 35MPa (F1/N)
   - GRADE BEAMS = 35MPa (F1)
   - COLD SLAB = 30MPa
   - WALLS = 35MPa
4. TIMBER SPECIES - D.FIR 24Fe

gec architecture

Project Team:

Prime Consultant
GEC Architecture

Structural Consultant
RJC Engineers

Mechanical Consultant
AME Group

Electrical Consultant
SMP Engineering

Civil Consultant
Design Works

Landscape Consultant
Design North

Refrigeration Consultant
Thermocarb

Client
Owner

Seal & Permit

PRELIMINARY - NOT FOR CONSTRUCTION

rjc Creative Thinking Practical Results

Read Jones Christoffersen Ltd.

RJC PROJECT # : CAL.130316.0002

NO.	ISSUED FOR	DATE
1	ISSUED FOR ...	2019/05/XX

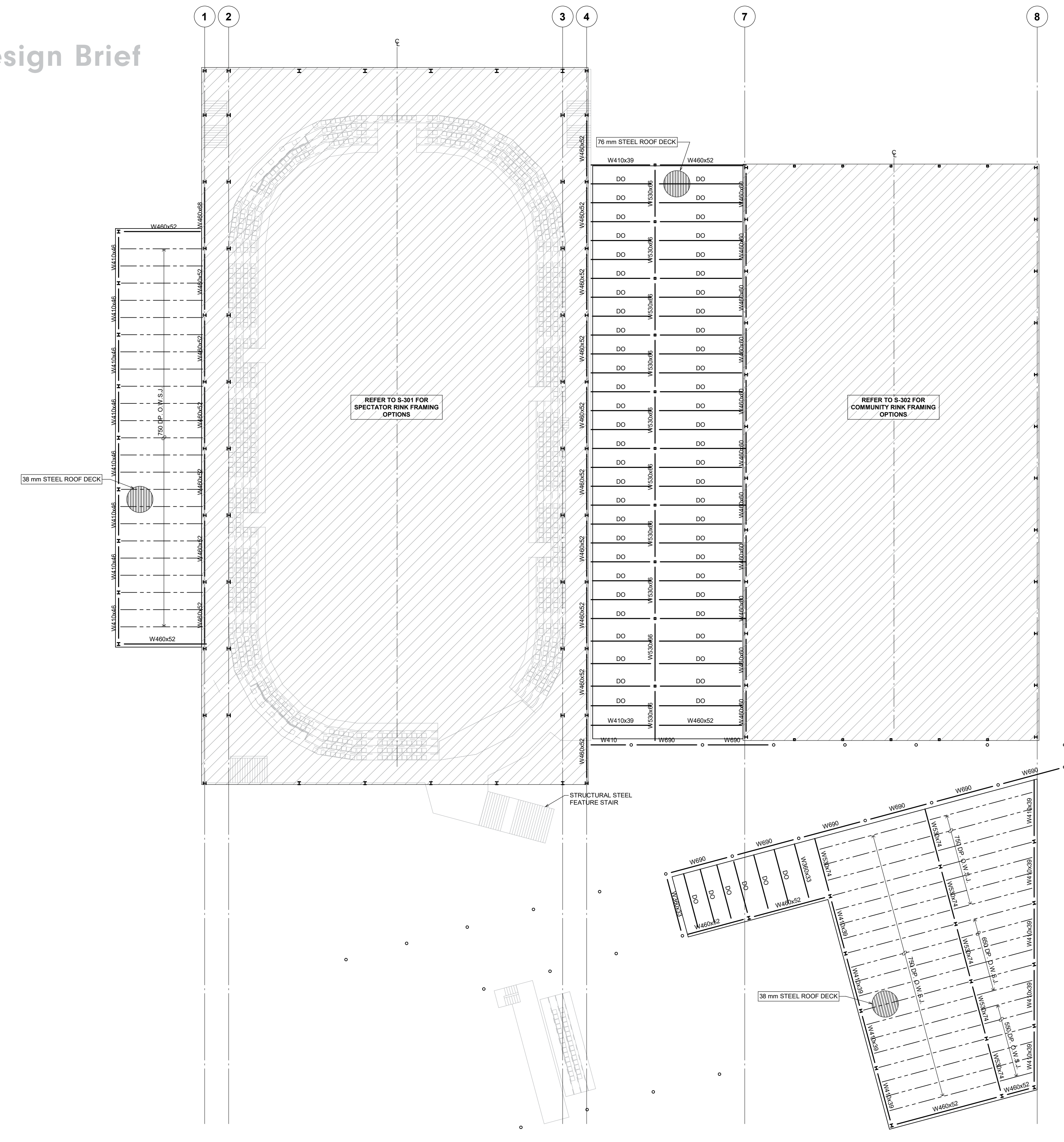
Drawing History

Scale: As indicated
Checked By: Checker

Project
SPRUCE GROVE CIVIC CENTRE

Drawing Title
MAIN FLOOR PLAN

Project Number: CAL.130316.0002
Drawing Number: S-201



2ND FLOOR FRAMING PLAN
1 : 200

NOTES:

1. CONTRACTOR TO MAKE ALLOWANCE FOR LATERAL BRACING SYSTEM - WHICH HAS YET TO BE DETERMINED. CONTRACTOR TO ASSUME COMBINATION OF STEEL BRACED FRAMES AND CONCRETE SHAFT WALLS.
2. SPECIFIED AREA LOADING
   - L1 EVENT LEVEL:
     LL = 4.8kPa
     SDL = 1.5kPa
   - CONCOURSE LEVEL:
     LL = 4.8kPa
     SDL = 1.5kPa
   - ROOFS + COMMUNITY ARENA ROOF:
     LL = 1.1kPa (+ PONDING + SNOW DRIFT)
     SDL = 1.25kPa
   - SPECTATOR ARENA ROOF:
     LL = 1.1kPa
     SDL = 1.7kPa
3. CONCRETE STRENGTHS
   - STRUCTURAL S.O.G. = 35MPa
   - PILECAPS AND PILES = 35MPa (F1/N)
   - GRADE BEAMS = 35MPa (F1)
   - COLD SLAB = 30MPa
   - WALLS = 35MPa
4. TIMBER SPECIES - D.FIR 24Fe

gec architecture

Project Team:

Prime Consultant
GEC Architecture

Structural Consultant
RJC Engineers

Mechanical Consultant
AME Group

Electrical Consultant
SMP Engineering

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Client
Owner

Seal & Permit

PRELIMINARY - NOT FOR CONSTRUCTION

rjc Creative Thinking Practical Results

Read Jones Christoffersen Ltd.

RJC PROJECT # : CAL.130316.0002

NO.	ISSUED FOR	DATE

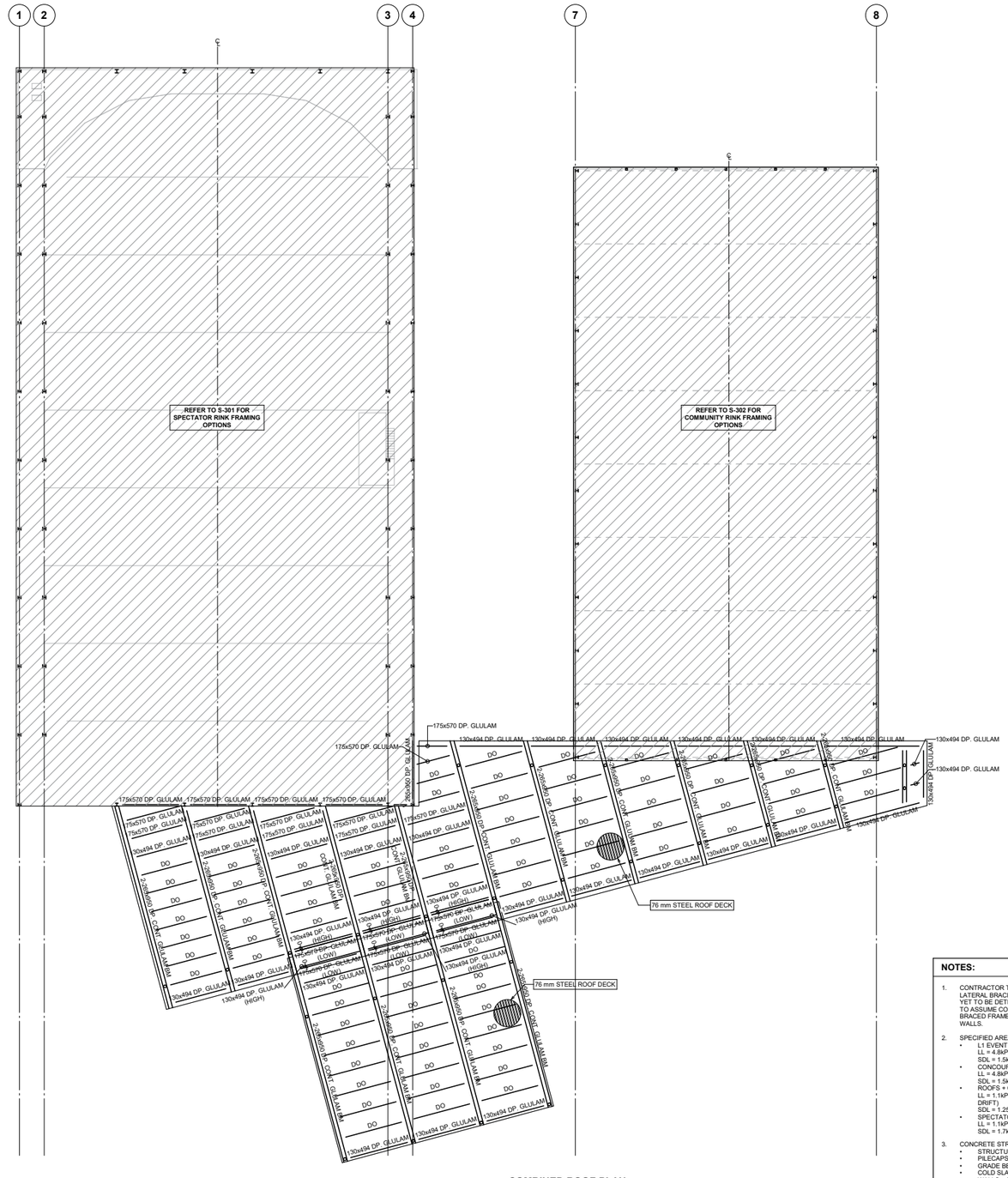
Drawing History

Scale: As indicated | Checked By: Checker

Project: SPRUCE GROVE CIVIC CENTRE

Drawing Title: SECOND FLOOR PLAN

Project Number: CAL.130316.0002 | Drawing Number: **S-202**



COMBINED ROOF PLAN
1 : 200

NOTES:

1. CONTRACTOR TO MAKE ALLOWANCE FOR LATERAL BRACING SYSTEM - WHICH HAS YET TO BE DETERMINED. CONTRACTOR TO ASSUME COMBINATION OF STEEL BRACED FRAMES AND CONCRETE SHAFT WALLS.
2. SPECIFIED AREA LOADING
   - L1 EVENT LEVEL: LL = 4.8kPa SDL = 1.5kPa
   - CONCOURSE LEVEL: LL = 4.8kPa SDL = 1.5kPa
   - ROOFS + COMMUNITY ARENA ROOF: LL = 1.1kPa (+ PONDING + SNOW DRIFT) SDL = 1.25kPa
   - SPECTATOR ARENA ROOF: LL = 1.1kPa SDL = 1.7kPa
3. CONCRETE STRENGTHS
   - STRUCTURAL S.O.G. = 35MPa
   - PILECAPS AND PILES = 35MPa (F1/N)
   - GRADE BEAMS = 35MPa (F1)
   - COLD SLAB = 30MPa
   - WALLS = 35MPa
4. TIMBER SPECIES - D.FIR 24Fe

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Project Team:

Prime Consultant
GEC Architecture

Structural Consultant
RJC Engineers

Mechanical Consultant
AME Group

Electrical Consultant
SMP Engineering

Civil Consultant
Design Works

Landscape Consultant
Design North

Refrigeration Consultant
Thermocarb

Client
Owner

Seal & Permit

PRELIMINARY - NOT FOR CONSTRUCTION

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Read Jones Christoffersen Ltd.

RJC PROJECT # : CAL.130316.0002

NO.	ISSUED FOR	DATE

Drawing History

Scale: As indicated

Checked By: Checker

Project
SPRUCE GROVE CIVIC CENTRE

Drawing Title
COMBINED ROOF PLAN

Project Number: CAL.130316.0002

Drawing Number: S-203

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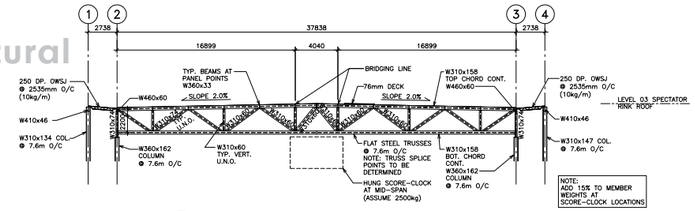
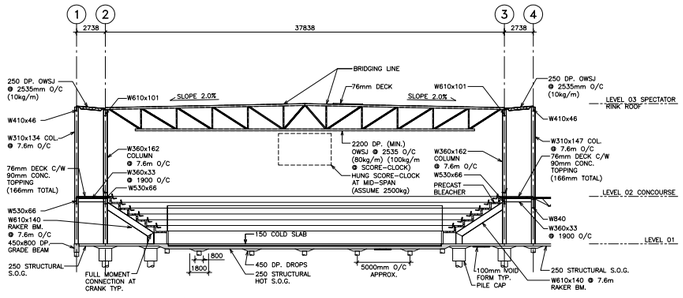
Appendix C Structural



2 S301 **SPECTATOR RINK - OPTION 2 : STEEL TRUSS**
1:200



1 S301 **SPECTATOR RINK - ROOF OPTION 1 : OWSJ**
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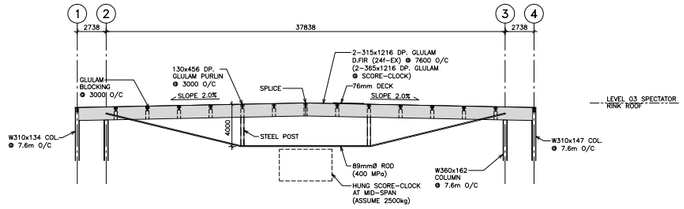
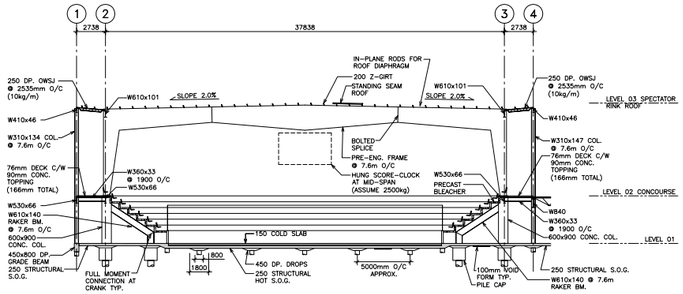
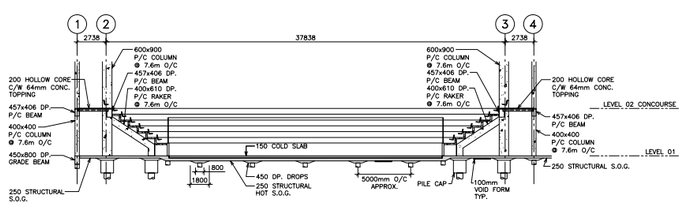


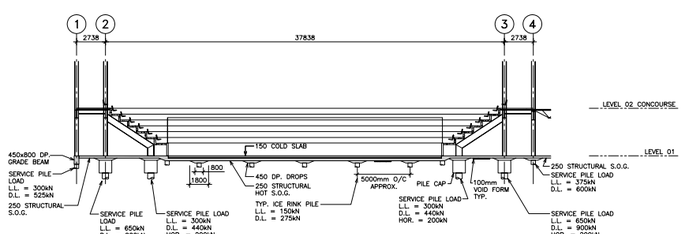
4 S301 **SPECTATOR RINK - OPTION 4 : GLULAM**
1:200



3 S301 **SPECTATOR RINK - ROOF OPTION 3 : PRE-ENG**
1:200



6 S301 **SPECTATOR RINK - PRE-CAST CONCOURSE OPTION**
1:200



5 S301 **SPECTATOR RINK - PILE LOADS**
1:200

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Project Team:

Prime Consultant
GEC Architecture

Structural Consultant
RJC Engineering

Mechanical Consultant
AME Groupg

Electrical Consultant
SMP Engineering

Civil Consultant
Design Works

Landscape Consultant
Design North

Refrigeration Consultant
Thermocarb

Client

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RJC PROJECT # : CAL.130316.0002

NO.	ISSUED FOR	DATE

Drawing History

Date	Checked By

Project
SPRUCE GROVE CIVIC CENTRE

Project Address

Drawing Title
SPECTATOR RINK FRAMING OPTIONS

Project Number 5855

Drawing Number S-301

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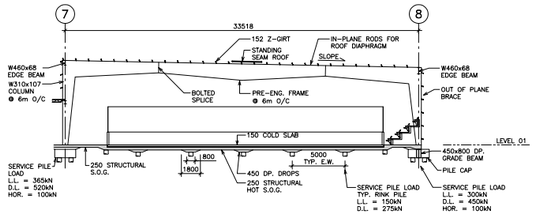
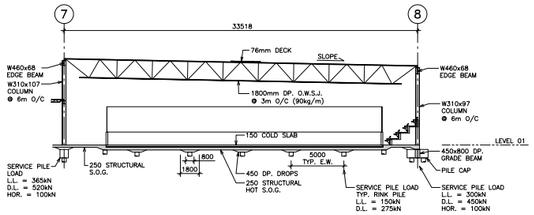
Appendix C Structural Design Brief



2 S302 **COMMUNITY RINK - ROOF OPTION 2 : PRE-ENG**
1:200



1 S302 **COMMUNITY RINK - ROOF OPTION 1 : OWSJ**
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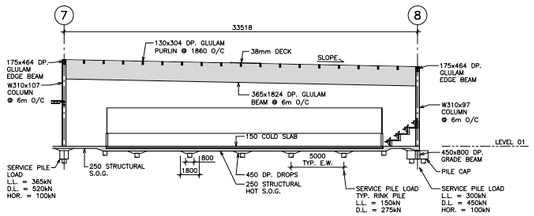

3 S302 **COMMUNITY RINK - ROOF OPTION 3 : GLULAM**
1:200

gec architecture

Project Team:

Prime Consultant
GEC Architecture

Structural Consultant
RJC Engineering

Mechanical Consultant
AME Groupg

Electrical Consultant
SMP Engineering

Civil Consultant
Design Works

Landscape Consultant
Design North

Refrigeration Consultant
Thermocarb

Client

Seal & Permit

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NO.	ISSUED FOR	DATE

Drawing History

Scale	Checked By

Project
SPRUCE GROVE CIVIC CENTRE

Project Address

Drawing Title
COMMUNITY RINK
FRAMING OPTIONS

Project Number	Drawing Number
5855	S-302

City of Spruce Grove

Transit Centre at the Spruce Grove Civic Centre

Structural Schematic Design Brief

Date: March 31, 2022
RJC Project Number. EDM.130316.0001

Prepared for:
GEC Architecture
310, 14055 West Block Drive
Edmonton, AB | T5N 1L8

Prepared by:

Frank Cavaliere, BSc, P.Eng., FEC, FGC (Hon.), LEED® AP , Parksmart Advisor
Mark Ritchie, BSc, MSc, PEng
Read Jones Christoffersen Ltd.
100, 17415 102 Avenue
Edmonton, AB | T5S 1J8

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Appendix C Structural Design Brief

1.0 INTRODUCTION

Read Jones Christoffersen Ltd. (RJC) has been engaged to provide the structural schematic design for the proposed Transit Centre located at the City of Spruce Grove Civic Centre, with the primary purpose of estimating construction values at a schematic level (Class 4) in accordance with AACE International Recommended Practice 18R-97 (Accuracy Range – Low: -15% to -30% / High +20% to +50%). The report herein describes the primary structure at a schematic level.

2.0 DESCRIPTION OF STRUCTURAL WORK

The scope of the Transit Centre includes the following components:

.1 Heated indoor washrooms
.2 Bus stop shelters and platform

At time of our review, a geotechnical report specific to the current project has not been provided and will be required to confirm our foundation assumptions. For the purposes of this report, we have used a report from CT and Associates dated July 2020 for the Westwind Commercial Lands.

3.0 STRUCTURAL DESIGN

The enclosed spaces will be supported on either concrete friction piles or steel screw piles. The foundations above the piles will consists of 250 or 300 wide by 600 deep reinforced concrete grade beams, and will support the 130 thick concrete floor slab and 190mm thick load-bearing concrete block walls. The roof will consist of 76mm deep deck spanning across the long direction of the spaces supported on the load-bearing block walls below. **See attached plans.**

The bus stop shelters will be pre-fabricated and engineered by others, and founded on the same pile system as the heated building.

4.0 ASSUMPTIONS

The following assumptions have been made with respect to the structural schematic design:

- Except where specifically noted otherwise, construction tolerances are as described in CSA A23.1/A23.2 for concrete construction and as per CSA S16.1 for steel construction.
- Assumed design criteria and material properties and described in **Appendix A** and **Appendix C**, respectively.

5.0 RISK ASSESSMENT

The following is a list of items in the design process, or inherent in this particular project, which may create risk to the Owner and should be reviewed in more detail to mitigate this risk. This list will be refined as the design progresses.

- The project design is not yet complete. Structural design continues to evolve in parallel with the design by other consultants and through an evolution of the program requirements. We recommend a design contingency be carried to reflect the preliminary nature of the available information.

- Based on our experience, we recommend a construction contingency be carried to cover the effect of unforeseen site conditions and unexpected construction process items, such as varying founding conditions, construction sequencing, the need for temporary bracing or shoring, etc.
- We also recommend an escalation contingency be carried to cover the effects of the escalation in construction costs from the time the cost estimate is prepared to the start of construction.

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Appendix C Structural

APPENDIX A – SUMMARY OF DESIGN CRITERIA

Unless otherwise noted, the design criteria for this project are summarized as follows:

A.1 DESIGN CODES AND STANDARDS

- Alberta Building Code (ABC), 2019 or National Building Code of Canada (NBC), 2015
- CSA S16 – "Design of Steel Structures"
- CSA A23.3 – "Design of Concrete Structures"
- CSA A23.1/A23.2 "Concrete Materials and Methods of Concrete Construction/Test Methods and Standard Practices for Concrete"
- CSA S304.1– "Design of Masonry Structures"

A.2 DESIGN LOADS – GENERAL

Design loads adhere to code requirements and are based on the intended building uses, building finishes and proposed building equipment. The importance factor for load types is based on the importance category. It is assumed the building is classified as NBC Importance category "Normal" based on its use. The resulting Importance Factors are summarized below.

	Importance Factor	
Load Type	Ultimate Limit States (ULS)	Serviceability Limit States (SLS)
Snow & Rain	1	0.9
Wind	1	0.75
Earthquake	1	N/A

A.2.1 DESIGN SUPERIMPOSED DEAD LOADS

Design superimposed dead loads (excludes structural self-weight) are based on the assumed roof and floor assemblies noted in the Architectural Report. The following specified superimposed dead loads were assumed:

Roof ..... 1.5 kPa

A.2.2 DESIGN LIVE LOADS

Specified uniform live loads used for design are below. Live load reduction factors are utilized to the extent as outlined by the code. (Refer to loading key plans for loading and locations)

Roof ..... 1.1 kPa

Specified Concentrated Load – Roof ..... 1.3 kN

A.2.3 DESIGN WIND LOADS

Design wind loads are calculated as per the National Building Code (NBC), using a 1 in 50 year return wind reference velocity pressure using the climatic data for the city in which the building will be located. For this project in the City of Spruce Grove q (1/50) = 0.45 kPa.

A.2.4 DESIGN SEISMIC LOADS

Seismic design loads are calculated as per NBC based on a 2% probability of exceedance in 50 years using design data for the city in which the building will be located. For this project in the City of Edmonton: Sa (0.2) = 0.10, Sa (0.5) = 0.06, Sa (1.0) = 0.03, Sa (2.0) = 0.01 and PGA 0.04.

The seismic force resisting system (SFRS) will be conventional concrete shear walls. R_d = 1.5 and R_o = 1.3 as per NBC.

A.3 DEFLECTION CRITERIA

The limitations are as per CSA S304.1, Design of Masonry Structures.

Deflection Criteria Summary (Live Load)

Roofs Span/180

Maximum Wind Storey Drift Height/400

Seismic Storey Drift Height/40

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Appendix C Structural Design Brief

APPENDIX B – STRUCTURAL MATERIALS

Unless otherwise noted, structural materials shall meet the following specifications and requirements:

B.1 STRUCTURAL STEEL AND CONCRETE REINFORCEMENT

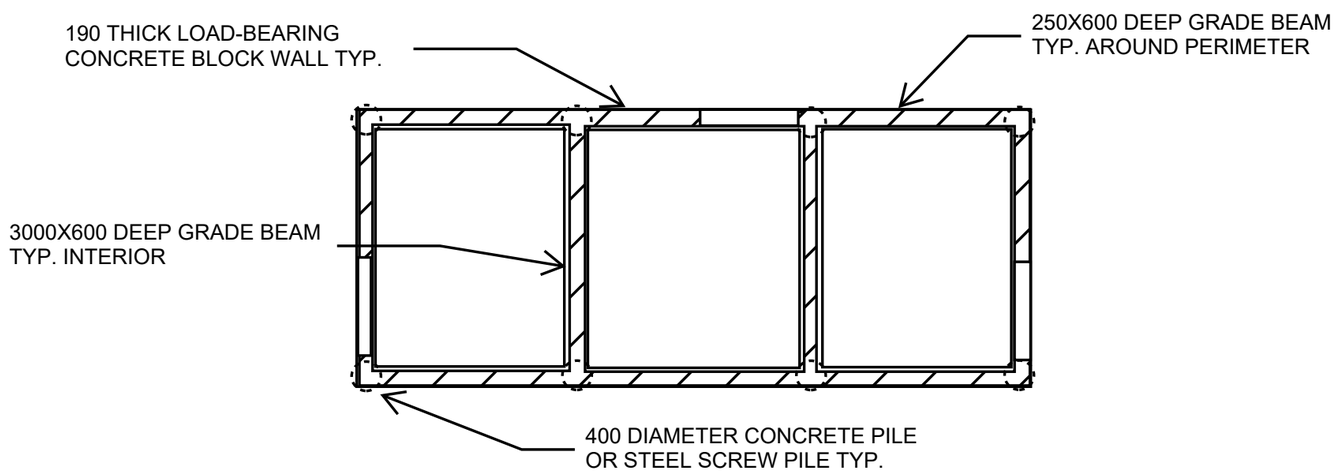
Channels, Angles & Plates:..... Grade 350W CAN/CSA-G40.20/G40.21

Steel Reinforcement for Concrete..... CSA G30 Series (F_y = 400MPa)

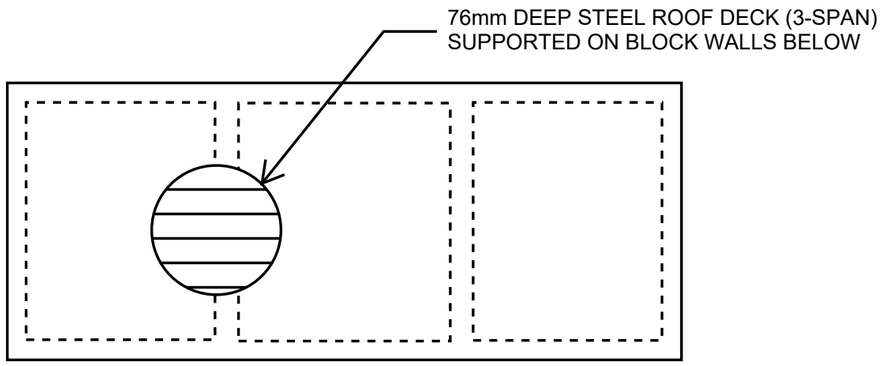
B.2 REINFORCED CONCRETE STRENGTHS

Reinforced concrete shall meet the requirements of CSA A23.1/A23.2-14 "Concrete Materials and Methods of Concrete Construction/Methods of Testing for Concrete" and shall generally adhere to the following requirements shown below.

Element	Concrete Strength (MPa) (f'c @ 28d)	Exposure Class
Pile-Caps, Piles, and Grade Beams	35	N/F1
Exterior Slab on Grade	35	C1



FOUNDATION PLAN
N.T.S.



gec architecture

Project Team:

Prime Consultant
GEC Architecture

Structural Consultant
RJC Engineers

Mechanical Consultant
AME Group

Electrical Consultant
SMP Engineering

Civil Consultant
Design Works

Landscape Consultant
Design North

Refrigeration Consultant
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Read Jones Christoffersen Ltd.

RJC PROJECT # : EDM.130316.0001

1. All drawings, plans, models, designs, specifications and other documents prepared by Read Jones Christoffersen Ltd. ("RJC") and used in connection with this project are instruments of service for the work shown in them (the "Work") and as such are and remain the property of RJC whether the Work is executed or not, and RJC reserves the copyright in them and in the Work executed from them, and they shall not be used for any other work or project.

2. These drawings are "design drawings" only. They may not be suitable for use as shop drawings. Use of these drawings as base drawings for "shop drawings" is not permitted unless written permission containing certain conditions and limitations is obtained from RJC. The work "as constructed" may vary from what is shown on these drawings.

3. Use of these drawings is limited to that identified in the Issued/Revision column. Do not construct from these drawings unless marked "Issued for Construction" by RJC in the Issued/Revision column, and then only for the parts noted. The drawings shall not be used for "pricing" / "costing" or "tender" unless so indicated in the Issued/Revisions column. "Pricing" or "Costing" drawings are not complete and any prices based on such drawings must allow for this.

Appendix D Mechanical Design Brief

SPRUCE GROVE CIVIC CENTRE

PROJECT NO.: 184C-031-21

SCHEMATIC DESIGN REPORT

APRIL 1, 2022

GEC Architects
#310, 14055 West Block Drive NW
Edmonton T5N 1L8
Canada

ATTN:
Andrew Afonso, Architect AAA, MRAIC
T: 780-421-8060
E: Andrew.afonso@gecarchitecture.com

PREPARED BY:
Jeff Hill, P.Eng.
Associate, AME Consulting Group Ltd.
E: jeffhill@amegroup.ca

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6. Applicable NFPA Regulations

7. Natural gas and propane installation code – CSA B149.1-15

8. Boiler and Pressure Vessel Act – CSA B51-14

9. American Society of Heating, Refrigeration and Air Condition Engineers (ASHRAE)

10. American Society of Plumbing Engineers (ASPE)

11. Sheet Metal Contractors Association of North America (SMACNA)

12. Conform to C.S.A. Standard B52 Mechanical Refrigeration Code 2013 Edition, CSA B51 Boiler, Pressure Vessel and Pressure Piping code 2014 Edition, and ASME B31.5 Refrigeration Piping Code 2013 Edition.

13. CSA Standard 432.94 for Safeguarding Machinery

14. ANSI/ASHRAE 15-1992 Safety Code for Mechanical Refrigeration

15. CSA Standard 432.94 for Safeguarding Machinery.

16. IIAR (International Institute of Ammonia Refrigeration) Regulations

17. All local rules, codes, regulations and safety orders which also apply

2.2 Plumbing Guidelines

1. The plumbing system will be designed to the National Plumbing Code 2015 (or newer version if required) and Alberta supplements. At this time, there are no anticipated specialty plumbing requirements.

2.3 Facility Fire Protection

1. Fire Suppression Requirements

.1 The fire suppression system will be designed to meet all requirements in National Fire Protection Association (NFPA). Any alternate solutions defined by the Code Consultant will be incorporate into this design.

SPRUCE GROVE CIVIC CENTRE
SCHEMATIC DESIGN REPORT
MARCH 31, 2022
PROJECT NO.: 184C-031-21

2. Fire Pump

.1 We do not anticipate a fire pump at this time. We will require hydrant test data near the site to validate this assumption.

3. Fire Extinguishers

.1 Fire extinguishers shall be provided to the requirements of the National Fire Code, NFPA 10 and the local authorities having jurisdiction.

.2 Semi-recessed of fully recessed stainless steel cabinets in dry wall or block wall assemblies in public areas. Back of house and mechanical space shall have wall mounted brackets.

2.4 HVAC Design Guidelines

1. The HVAC system will be designed to meet all requirements:

   .1 National Building Code 2015 (or newer if required) the energy standard

   .2 National Energy Code of Canada for Buildings NECB: 2017

   .3 ASHRAE 62.1-2002 Ventilation for Acceptable Indoor Air Quality as per National Building Code 2019 – Alberta Edition

   .4 The ASHRAE Standards will be updated if required to newer version as indicated an any new building codes.

2. The building heating and cooling loads will be calculated based on the following outdoor conditions specified in the National Building Code 2019 – Alberta Edition, For Spruce Grove, Alberta:

Design Temperatures			Degree Days
January	July 2.5%		
1 % Design °C	Dry Bulb °C	Wet Bulb °C	
-25	28	19	5300

3. Our design for the entire facility will include 20% safety for all primary heating systems and 0% safety for cooling systems unless specifically noted otherwise within this report. Furthermore, we will have redundancy on all Hydronic heating systems including boilers and pumps.

4. The HVAC system will be designed such that the noise level in the spaces will be maintained to meet ASHRAE suggested guideline:

5. Between 25-35dB in enclosed offices and multi-purpose spaces

6. Between 20-25dB in Library and Theatre areas.

7. Between 30-40dB in open public areas.

8. Between 40-50dB in the arenas.

9. Indoor space temperatures will follow ASHRAE 55 standards. Where possible higher airflow velocities may be used to allow for a higher room temperature setpoint.

SPRUCE GROVE CIVIC CENTRE
SCHEMATIC DESIGN REPORT
MARCH 31, 2022
PROJECT NO.: 184C-031-21

Space Type	Cooling Design Temp (ºC)	Heating Design Temp (ºC)	Design RH (%)
Spectator Arena	24	12	40
Community Arena	-	8	40
Arena Change rooms	-	22	30
Saints Dressing Room	24	22	15
Library	24	22	15
Theatre	24	22	15
Offices	24	22	15
Elevator Machine Rooms	27	22	15
IDF/Telecom Rooms	29	-	N/A

2.5 Site Services

1. Transit Centre Facility

   .1 Water – 50mm (2”) domestic water services is required

   .2 Storm – 100mm (4”) Storm services is required based on National Building Code 2019 – Alberta Edition for rainfall intensity of 22mm based on 15 minutes of rainfall duration. Rainwater leaders will be connected inside the building before exiting the building below grade to the site storm system.

   .3 Sanitary – 100mm (4”) sanitary services is required

2. Main Facility

.1 Water – 150mm (6") combined domestic water/fire protection services is required

.2 Storm – 525mm (21") Storm services is required required based on National Building Code 2019 – Alberta Edition for rainfall intensity of 22mm based on 15 minutes of rainfall duration. Rainwater leaders will be connected inside the building before exiting the building below grade to the site storm system.

.3 Sanitary – 200mm (8") sanitary services is required

.4 Natural Gas – 35kPa (5psi) natural gas services is required to the facility with regulators at gas fired appliances down to working pressure. 35kPa gas will be run throughout the facility to gas appliances.

SPRUCE GROVE CIVIC CENTRE
SCHEMATIC DESIGN REPORT
MARCH 31, 2022
PROJECT NO.: 184C-031-21

Space Type	Approximate Design Occupant Density (#/100sm)	Net Combines Outdoor Air Rate (L/s m2)	Relative Pressure	Demand Control Ventilation
Ice Rinks	2.5	0.42	Positive to adjacent spaces	Yes
Change Rooms	N/A	Exhausr at 10.0 L/s m^2 of "wet" change room area	Positive to rink but negative to building in general	Yes
Theatre	70	4.05	Neutral	Yes
Library	8.0	0.85	Neutral	Yes
Loading Dock	N/A	3.7 (E/A)	Negative to adjacent spaces	N/A

3. ARENA REFRIGERATION SYSTEMS

.1 The mechanical design will operate in conjunction with arena refrigeration to utilize waster heat from the arena system. The Low charge Ammonia plate heat exchanger will transfer 100% of the waste heat into a secondary glycol loop. This glycol loop will provide possible heating to the following systems:

.1 Arena underslab heat to prevent frost heaving

.2 Domestic hot water pre-heat

.3 Possible investigation of Radiant infloor heat for Arena concourse (if budget permits)*

.4 Snow melting (pit)

4. PLUMBING SYSTEMS

4.1 The domestic Hot Water System:

1. The domestic hot water plant will consist of multiple natural gas-fired 95% efficient power direct-vented closed combustion commercial water heaters and a storage tank with heat exchangers to pre-heat cold domestic water make-up with heat rejected from the ice plant. Domestic hot water will be supplied at 60 deg C to service general areas, kitchens and tempered water mixing valves

2. Tempered water mixing valves will be strategically located close to the banks of change rooms and washrooms which will allow tempered water only to be supplied to showers and lavatories.

3. Separate water heaters and a storage tank will be provided for the arenas and for Zamboni hot water flooding plant.

4.2 Plumbing Fixtures

1. All fixtures will be commercial grade, CSA approved, made of vitreous china or stainless steel.

2. All public water closets will be floor-mounted or wall hung low flow flush valve type with hands-free activation.

3. Urinals will be low flow flush valve type with hands-free activation.

4. Lavatories will be equipped with single temperature hands-free sensor faucets.

5. Barrier-free fixtures, including drinking fountains, will be provided where required.

6. Manually operated single temperature showers with timed metering valves and narrow spray pattern vandal-resistant shower heads will be provided.

7. Drinking fountains with bottle fillers will be provided in the fitness rooms and natatorium as a minimum and as directed by the programme. The drinking fountains will be refrigerated.

8. Non-freeze hose bibbs will be installed in areas subject to freezing (exterior landscaped areas, as required).

9. Floor drains with trap primers where required by the City of Spruce Grove will be provided in mechanical rooms, washrooms and in any other rooms as required.

10. Emergency eyewash and shower will be provided in the refrigeration machine room and other locations where chemical spills may be a concern.

SPRUCE GROVE CIVIC CENTRE
SCHEMATIC DESIGN REPORT
MARCH 31, 2022
PROJECT NO.: 184C-031-21

5. FIRE PROTECTION SYSTEMS

The new facility will be fully sprinklered with an NFPA-13 compliant wet-pipe sprinkler system and will be complete with supervisory and tamper switches on all main isolation valves, backflow prevention, flow switches, and sprinkler flow control valve assemblies for each zone. -Dry sprinklers will be used in areas subject to freezing.

5.1 Zoning

The building will be zoned as follows:

.1 Arenas, retail & mechanical & storage areas will be zoned and designed to NFPA-13 Ordinary Hazard and other areas will generally be zoned and designed to NFPA-13 light hazard.

.2 The two arenas will be provided with wet pipe sprinkler systems. This is predicated on both arenas being maintained at a minimum space temperature of 8 deg C.

.3 Maximum zone sizes will be in accordance with NFPA-13.

6. HEATING, VENTILATION AND COOLING SYSTEMS:

6.1 Central Hot Water Boiler Plant

1. A central boiler plant will provide heating water to the radiant ceiling panels (RCP), perimeter radiation cabinets, possible in floor heat as mentioned above and secondary heating sources throughout the facility including entrance heaters, unit heaters and reheat coils. The high efficiency hydronic boiler plant will use multiple near-condensing modulating boilers . The system will be piped in a primary / secondary arrangement with the boilers and their circulation pumps forming the primary loop that adds heat to the pumped variable flow secondary loop via a common pipe.

2. The system will be sized for the peak heating load within the and building heat loss for the additional equipment with a 20% safety factor on the system.

3. *Possible Radiant Floor Heating System will be installed within the arena Concourse budget permitting. The radiant floor piping loop will be a closed loop system operating at temperatures ranging between 27C and 52C depending on the outside temperature. A heat exchanger integral to the Ice Plant will be the primary heat source for the radiant floor heating with the ability to inject heated glycol from the boiler plant when recovered Ice Plant heat is insufficient.

4. Radiant Ceiling Panels (RCP) and perimeter radiation will be used in place of the heated floor and in areas outside the arenas if budget doesn't allow for heated floor slabs,

6.2 Space Cooling

1. Packaged gas-fried and packaged DX refrigerated custom roof top cooling units will serve to cool the spaces as required. Spectator arena and Theatre will utilize displacement ventilation strategies to reduce cooling loads and save fan power energy. Other areas will utilize overhead mix air ventilation to cool the spaces with variable air volumes (VAV).

6.3 HVAC for Arenas, Change Rooms, Common Areas, Lobbies, Library, Theatre, Administration Areas

1. Packaged roof or grade-mounted HVAC units will be used to condition all areas of the facility except where noted. The units will be sized and zoned to suit the areas served and their expected occupancy levels. Where units serve areas with multiple thermostatic zoning, they will be equipped for Variable Air Volume (VAV) operation, with each temperature-controlled room or area equipped with a VAV terminal unit.

2. Each packaged HVAC unit will include the following:

.1 High Efficiency Airfoil blade supply & return fans

.2 Multiple stages of high efficiency cooling with hot gas bypass for control

.3 100% modulating economizer with low leakage insulated blade dampers, fault diagnostics, minimum O/A reset based on R/A CO2 or outside air humidity or controls sequence as required.

.4 VAV equipped where required– maintain S/A temperature & duct static at setpoint. S/A temp reset based on outside air temp.

.5 Minimum 15:1 modulating gas heat with 90% high-efficiency condensing heat exchangers.

.6 Insulated roof curbs high enough to accommodate Horizontal discharge S/A, R/A where required.

.7 MERV 8 pre-filters, MERV 13 final filters, filter pressure drop monitoring

.8 Integral fan Airflow measurement

.9 BACnet interface to allow full monitoring & control via BMS. Final requirements to be confirmed.

.10 NECB2017 compliant integral energy recovery wheel with integrated defrost and capacity Controls, 4" MERV 8 outdoor air filters with dirty filter alarm, wheel bypass dampers, slide out wheel cassette.

.11 Double wall insulated cabinet & service/access doors with lever-lock handles.

.12 Stainless steel heat exchangers, suitable for -40C entering air temperature when in 100% make-up / 100% exhaust mode.

.13 Units to be 600V / 3 ph packaged equipment with single point power connection and integral transformers where lower voltages are required.

6.4 Arena Dehumidification:

The spectator arena will have a dedicated desiccant dehumidifier to maintain relative humidity for proper ice conditions. The dehumidifying units will be mounted on the roof of the building.

The community arena will have a single combination ventilation/dehumidification unit capable 100% outdoor air operation which shall modulate based on demand control through space CO2 sensors.

.1 Each bank of change rooms will be conditioned by a packaged HVAC unit as noted above. The units will operate with 100% outside air & 100% exhaust air.

.2 The fresh air will be supplied to the change room area. Exhaust air grilles will be located in the shower and toilet areas. Each zone will be pressure neutral to the arena and negative pressure to the lobby.

.3 Perimeter radiation or RCP heating will be reviewed for these spaces for space heating.

6.5 Exhaust Systems

1. Exhaust of washrooms will be provided by central HRV units with supplemental hydronic heating coils where required.

2. Common storage areas will be exhausted as required through separate ductwork back to the HRV feeding that zone.

3. Arena areas will require CO and NOX detectors if ice resurfacing machine is gas or propane fired. These systems will be used to control exhaust and outdoor air for the space. Electric resurfacing machines will not have this function for the arena space but will have battery charging exhaust requirements. To be discussed further in design development.

6.6 Specialty Systems

1. **Commercial kitchen range hoods** will be exhausted through fully welded duct systems & dedicated ULC listed exhaust fans. These systems will be designed to meet NFPA 96 and NECB-2017 requirements.

.1 These zones will require dedicated make-up air units connected to each exhaust system. They are anticipated to be located up in the mechanical room on top of this section of the building. We believe that each fan system will be on the order of approximately 5,000 cfm or 2,500 L/s in capacity each as a high limit.

2. Refrigeration Plant Room:

.1 The Ice Plant Room will be ventilated and exhausted in accordance with the CSA B52 Refrigeration Code. This will generally be accomplished with exhaust fans suspended within the room exhausting through wall louvers and drawing from high and low level ductwork within the room. Motorized dampers & wall louvers will be provided for make-up of unconditioned outside air. The system will run at low speed when the ice plant is operating and will revert to high speed upon detection of high levels of ammonia.

3. Elevator Machine Rooms:

.1 A dedicated fan coil unit will be provided for this room and sized based on elevator manufacturer requirements.

4. IT/Server Rooms:

.1 These spaces will heat reverse acting thermostats with exhaust fans to cool spaces.

.2 Dedicated Split AC units will be investigated as the IT requirements are finalized.

6.7 Major Equipment

Spectator Arena Unit

AHU-1 (100% O/A unit)
Engineered Air FWE1057/DG/HRW/O/MV
Elec: MCA 291A
S/A Fan 37,500 cfm @ 2.5" ESP with VFD
R/A Fan 37, 500 CFM @ 1" ESP with VFD
Indirect gas fired with 2000 MBH Output Cap.
100 Tons of cooling with built in condensing units
With energy recover wheel.

SPRUCE GROVE CIVIC CENTRE
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MARCH 31, 2022
PROJECT NO.: 184C-031-21

DEHUM-1 (Dehumidification Unit)
Engineered Air LM13/HER/DWD400/O
Elec: MCA 19.5A
Regenerative wheel type 16" thickness to be sized at 400lb/hr @ 10,000 cfm

Community Rink Unit
AHU-2 (Hybrid unit with integrated Dehumidification (Regen core))
Engineered Air DJS60/DWD/HER/O
Elec: MCA 19.9A
S/A 5000 CFM @ 2.5" ESP (VFD)
R/A 5000 CFM @ 1" ESP (VFD)
Indirect gas fired with 400 MBH Output Cap.
Dehumidification Regenerative wheel 16" thickness 125lb/hr @ 5000 cfm
Mixed air unit total S/A of 5000cfm with capability to have 100% O/A.
No cooling required

Shared Lobby/Library
AHU-3 (Mixed air unit with heat recovery, DX cooling & indirect gas fired)
Engineered Air FWE655/DJS/HRW/O/MV
Elec: MCA 175.3A
S/A 25000CFM @ 2.5" ESP
R/A 22000CFM @ 1" ESP
O/A 8000 CFM
65 TONS OF COOLING
Indirect gas fired with 900 MBH Output Cap.
Heat Wheel.

Theatre /Staging
AHU-4 (Mixed air unit with heat recovery, DX cooling & indirect gas fired)
Engineered Air FWE224/DJS/HRW/O/MV
Elec: MCA 58.6A
S/A 6400 CFM @ 2.5" ESP
R/A 6400 CFM @1" ESP
O/A 4100 CFM
20 TONS OF COOLING
Indirect gas fired with 450 MBH Output Cap.

Saints Dressing+ Training
AHU-5 (Mixed air unit with DX cooling & indirect gas fired)
Engineered Air FWE123/DJS/HRW/O/MV
Elec: MCA 40.4A
S/A 4500 CFM @ 2.5" ESP
R/A 4500 CFM @1" ESP
O/A 1000 CFM
12 TONS OF COOLING
Indirect gas fired with 120 MBH Output Cap.

CHANGE ROOMS
HRV-1(100% O/A Unit with indirect gas fired heating only)
Engineered Air DJS100/HRW/O/MV
Elec: MCA 37.5A
S/A 9000 CFM @ 2" ESP
R/A 9000 CFM @1" ESP
Indirect gas fired with 1000 MBH Output Capacity. Heat wheel.

Heating Plant
Hot Water Boilers
B-1,2
Lochinvar - Crest (Near Condensing Boilers)
FB-2501

P-1,2
Boiler Circ Pumps
Bell & Gosset E-80 (4x4x7B)

P-3,4
Main Heating Pumps
C/w Integral VFDs
Bell & Gosset E-80 (2.5x2.5x9.5C)

Domestic Hot Water Plant
DHWT-1,2
AO SMITH BTHL-250A
DHWT-3
AO SMITH TVJ-250A (STORAGE TANK)

Zamboni Flood Hot Water Plant
DHWT-4,5
AO SMITH BTHL-150A

TRANSIT STATION
HRV-1(100% O/A Unit with ELEC heating only)
ALDES H650-Fi-P
S/A 300 CFM @ 1" ESP
R/A 300 CFM @1" ESP
Electric Preheat for frost prevention
Heat wheel.

Electric CUHS
3KW Electric Heat Cabinet Unit Heaters
1 per space.

7. CONTROL SYSTEMS

7.1 Mechanical Building System

1. All major mechanical systems will be equipped with Direct Digital Control (DDC) systems. This will include all equipment located in mechanical Rooms as well as the packaged outdoor systems and terminal zone temperature control equipment.

~~2.~~ The entire building will be controlled by BACnet compatible components. BACnet is an ASHRAE protocol that allows standardised data communication for complete automation and control of building systems.

3. Some type of DDC interface control is recommended for the lighting system. This will allow the energy consumption to be monitored and then controlled depending on the demand, i.e. if a light is not required in a particular space then the main control system will turn it off. This load shedding system could significantly reduce the annual energy consumption of the building.

4. The majority of the wall mounted thermostats will be installed for zone temperature control, occupancy sensor and CO_2 sensor. Protective covers will be installed on the sensors within the public spaces. The administrative areas will allow a small amount of manual temperature control by the occupants. The rest of the sensors will be controlled centrally through the DDC interface.

END OF REPORT

8. APPENDIX: MECHANICAL DRAWINGS

A Appendix

Appendix D Mechanical Design Brief

3 A200 OPTION 24 -COMPOSITE- LEVEL 01 WITH DIMS

SPACE SERVED BY 100 % O/A UNIT AHU-1 & DEHUMIDIFICATION UNIT DEHUM-1 DISPLACEMENT VENTILATION WITH HYDRONIC PERIMETER HEATING

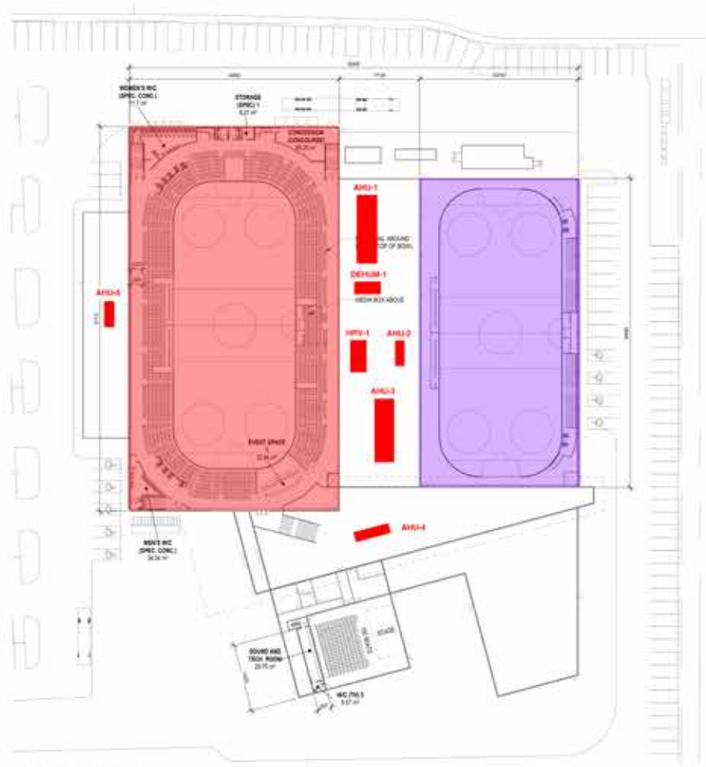
SPACE SERVED BY MIXED AIR UNIT AHU-2. UNIT IS HEATING ONLY WITH BUILT IN DEHUMDIFICATION SECTION.

SPACE SERVED BY MIXED AIR UNIT AHU-3. VAV BOXES FOR EACH INDIVIDUAL SPACEWITH RADIANT PANELS

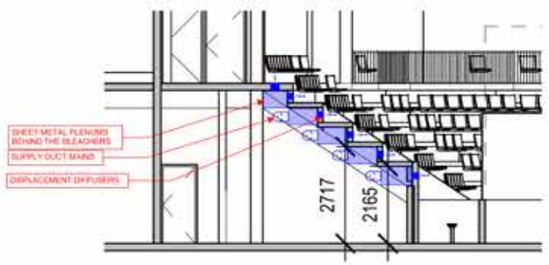
SPACE SERVED BY MIXED AIR UNIT AHU-4. DISPLACEMENT VENTILATION WITH HYDRONIC PERIMETER HEAT

SPACE SERVED BY MIXED AIR UNIT AHU-5. VAV BOXES FOR EACH INDIVIDUAL SPACE WITHHYDRONIC PERIMETER HEATING

SPACE SERVED BY HRV-1. SUPPLYING 100% O/A TO SPACES WITH EXHAUST.



2 OPTION 24 -COMPOSITE- LEVEL 02 CONCOURSE WITH DIMS



DISPLACEMENT VENTILATION DETAIL FOR SPECTATOR RINK

gec architecture

Project Team:

Prime Consultant: GEC Architecture

Structural Consultant: RJC Engineering

Mechanical Consultant: AME Groupg

Electrical Consultant: SMP Engineering

Civil Consultant: Design Works

Landscape Consultant: Design North

Consultant Other: Thermocarb

Client: Client Name and/or Logo

Stamp & Permit:

PRELIMINARY - NOT FOR CONSTRUCTION

NO	ISSUED FOR	DATE

Drawing History

Scale: 1 : 400

Drawn By: Checker

Project: SPRUCE GROVE CIVIC CENTRE

Project Address:

Drawing Title: MECHANICAL AIR HANDLING EQUIPMENT LOCATIONS AND SERVED SPACES

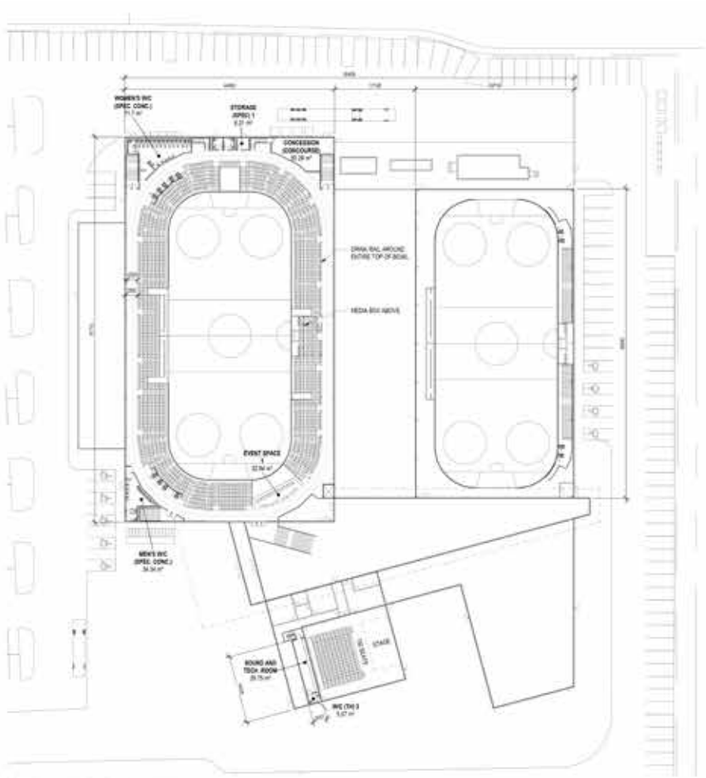
Project Number:

Drawing Number: M1

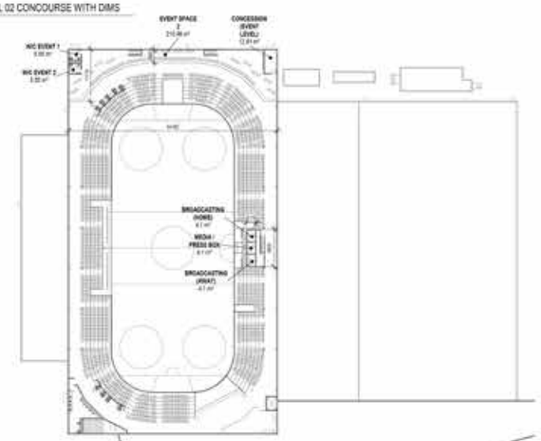
A Appendix

Appendix D Mechanical Design Brief

3 A200 OPTION 24 -COMPOSITE- LEVEL 01 WITH DIMS



2 A200 OPTION 24 -COMPOSITE- LEVEL 02 CONCOURSE WITH DIMS



1 A200 OPTION 24 -COMPOSITE- LEVEL 03 EVENT SPACE WITH DIMS

OPTION 24 - GROSS FLOOR AREA		
Name	Area	Area Sqft
OPTION 24 - LEVEL 1 GFA	9828.33 m²	105791.28 ft²
OPTION 24 - LEVEL 3 - EVENT SPACE	252.69 m²	2719.88 ft²
OPTION 24 - LEVEL 3 - MEDIA BOX	29.73 m²	320.03 ft²
OPTION 24 - LEVEL 2 GFA - SPEC	1979.49 m²	21307.01 ft²
OPTION 24 - LEVEL 2 GFA - THEATRE	51.11 m²	550.17 ft²
Grand total: 5	12141.35 m²	130698.36 ft²

gec architecture

Prime Consultant: GEC Architecture
Structural Consultant: RJC Engineering
Mechanical Consultant: AME Groupg
Electrical Consultant: SMP Engineering
Civil Consultant: Design Works
Landscape Consultant: Design North
Consultant Other: Thermocarb

Client: Client Name and/or Logo

PRELIMINARY - NOT FOR CONSTRUCTION

NO.	ISSUED FOR	DATE

Drawing History

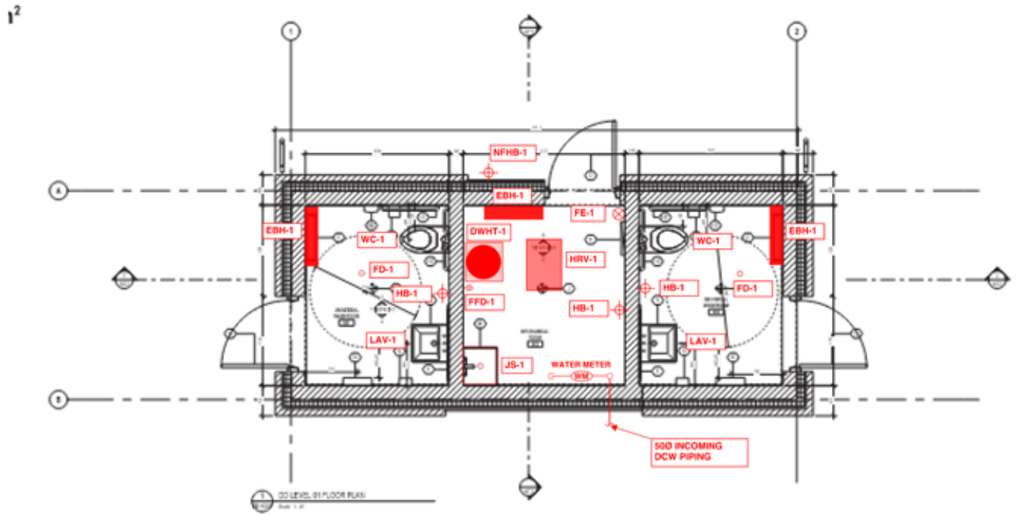
Scale: 1 : 400 | Approved by: Checker

Project: SPRUCE GROVE CIVIC CENTRE

Project Address

Drawing Title: CIVIC CENTRE MECH. EQUIPMENTS

Project Number | Drawing Number: M2



LAV-1 WALL HUNG LAVATORY C/W AUTOMATIC FAUCER, ADA
WC-1 WALL HUNG WATER CLOSET C/W FLUSH VALVE , ADA
FD-1 100Ø SANITARY FLOOR DRAIN
FFD-1 FUNNEL FLOOR DRAIN
HB-1 HOSE BIB
NFHB-1 NON FREEZE HOSE BIB
JS-1 JANITOR SINK
DHWT-1 ELECTRIC DOMESTIC HOT WATER TANK
HRV-1 HEAT RECOVERY VENTILATOR WITH ELECTRIC PREHEAT (150 L/S)
EBH-1 ELECTRIC BASEBOARD HEATER
FE-1 FIRE EXTINGUISHER

gec architecture

Project Team:
Prime Consultant: GEC Architecture
Structural Consultant: RJC Engineering
Mechanical Consultant: AME Groupg
Electrical Consultant: SMP Engineering
Civil Consultant: Design Works
Landscape Consultant: Design North
Consultant Other: Thermocarb

Client: Client Name and/or Logo

Seal & Permit

PRELIMINARY - NOT FOR CONSTRUCTION

NO	ISSUED FOR	DATE

Drawing History
Issue | Checked by: Checker

Project: SPRUCE GROVE CIVIC CENTRE
Project Address:

Drawing Title: TRANSIT CENTRE MECH. EQUIPMENTS

Project Number | Drawing Number: M3

Appendix E Refrigeration Design Brief

ThermoCarb Ltd.	**Spruce Grove Civic Centre** **Schematic Design Refrigeration**	The City of SPRUCE GROVE
REV.0	March 25, 2022	TITLE PAGE

CLIENT:	City of Spruce Groove
PREPARED FOR:	GEC Architecture
CONSULTANT:	THERMOCARB LTD.
RE:	Spruce Grove Civic Centre – Refrigeration Schematic Design Report
ATTENTION:	Andrew Afonso, Architect
SUBMISSION DATE:	March 25, 2022
CONTACT:	**ThermoCarb Ltd.** 200, 1204 Kensington Road Calgary, Alberta, Canada T2N 3P5
CHIEF CONTACT:	Craig Weller Ph: (403) 262-1051 Cell: (587) 435-3125 Email: craig.weller@thermocarb.ca

ThermoCarb Ltd. | Spruce Grove Civic Centre
Schematic Design Refrigeration | The City of SPRUCE GROVE

EXECUTIVE SUMMARY

The City of Spruce Grove plans to construct a new Civic Centre which will include two NHL sized ice surfaces. The proposed refrigeration system is a low charge ammonia system packaged in a stand alone, skid mounted building that meets CSA B-52 Class T requirements. The package will be installed adjacent to the main building. The proposed system will have the required capacity to allow both arenas to operate year-round and will provide optimal ice conditions in high outside ambient conditions. Ethylene glycol will be used as the secondary refrigerant which will be circulated through a polyfusion welded, HDPE piping system within the refrigerated concrete slabs. The headers for each arena will be cast into the refrigerated slab, reducing maintenance and operation requirements of a header trench.

The proposed system will use energy efficient compressors, plate and frame heat exchangers, adiabatic fluid cooler, VFDs and controls to maximize the efficiency of the system. Ammonia is up to 30% more efficient that alternative refrigerants, is a natural refrigerant with no ozone depleting or green house gas effects and is easily detectible by smell (self alarming) at low concentrations. Having the refrigeration plant installed in a separate building provides an additional layer of separation between the building users and the ammonia.

THERMOCARB LTD. 2022

PROJECT OVERVIEW

The City of Spruce Grove plans to construct a new Civic Centre which will include two NHL sized ice surfaces. A new low charge, ammonia refrigeration system located in a stand alone, skid mounted, Class T mechanical room will supply the cooling for the two arenas.

DESIGN CRITERIA

The refrigeration system requires enough capacity to allow two NHL ice surfaces, (one 1400 seat spectator arena and one 250 seat community arena), to operate year-round.

ICE PLANT SYSTEM

The proposed refrigeration system is a low charge ammonia system packaged in a stand alone, skid mounted building that meets CSA B-52 Class T requirements. The package will be installed adjacent to the main building. A secondary refrigerant of ethylene glycol will be circulated through the refrigerated slabs. A low charge system can reduce the mass of ammonia in a system to as low as 0.5 lbs/TR, compared to existing ammonia systems servicing twin arenas which may have as much as 10-12 lbs/TR. Low charge systems allow the entire ammonia system including the relief system, to be enclosed within the stand alone Class T mechanical room.

The proposed system includes the following:

- PLC Control system including required transmitters, with MCC to house all starters. The system will have remote viewing capabilities to allow operations to view the plant operation from offsite
- Two Mycom MII series compressors with VFDs to provide redundancy, efficiency and long maintenance intervals
- Plate and frame condenser to minimize piping volumes and refrigerant charge
- An adiabatic fluid cooler to reduce the water usage by up to 80%, and remove water treatment requirements when compared to a traditional system, will be installed on a stand on top of the package.
- Two direct expansion, plate and frame chillers for redundancy, efficiency and to minimize piping volume and refrigerant charge
- VFD control of secondary refrigerant pumps to maximize efficiency
- Heat reclaim for under-slab heating, snow melt pit, and domestic water preheat. The condenser glycol loop will capture the waste heat to be used by the other systems.

ThermoCarb Ltd.	Spruce Grove Civic Centre Schematic Design Refrigeration	The City of Spruce Grove
REV.0	March 25, 2022	Page 3 of 4

- A deluge tank for the relief system discharge to keep all ammonia within the Class T mechanical room envelope
- Ethylene glycol secondary refrigerant to be circulated wthin the refrigerated slabs
- Secondary refrigerant distribution system to be constructed with polyfusion welded HDPE piping to provide cooling the refrigerated slabs for each arena.

The stand alone building provides an additional layer of separation between the refrigeration system and building occupants, reduces the work taking place on site during construction, and can offer cost savings compared to building a new refrigeration room complete with ventilation requirements. The entire system is built in a shop off site and installed on a skid, complete with building and ventilation/detection systems and delivered to site. The skid is installed on piles at site and connected to the secondary refrigerant system, underfloor (under refrigerated slab) heat system, snow melt system and any heat recovery loops in the system as required. The fluid cooler will be installed on the roof of the skid to minimize the system footprint.

SECONDARY REFRIGERANT

Ethylene glycol is the recommended secondary refrigerant for buried header systems to reduce the risk of circuit blockages that can occur with crystallization of calcium chloride brine, but glycol goes reduce the efficiency of the heat transfer and pumping in the system by 5-10% compared to brine.

An option that may be considered for this project is the use of AQUA as the secondary refrigerant. AQUA, (ammonia hydroxide), is an ammonia in water solution with heat transfer and viscosity properties approximating water, and freeze suppression of glycol or chloride brine. This results in reduced pumping costs and lower temperature differentials across the heat exchangers resulting in more efficient operating conditions. AQUA has been commonly used in Europe (predominantly Sweden) for hockey rink applications and has recently been installed with success in a few facilities in North America. AQUA does have an ammonia odor, so leaks may be mistaken for an ammonia leak, however the use of a fully welded HDPE system significantly reduces the risk of nuisance odors.

FLOOR PIPING DESIGN

The proposed floor piping system uses polyfusion welded, HDPE mains, headers and floor circuits for both the cold and warm floors. This design buries the cold glycol headers within the concrete floor, removing the need for a header trench, trench cover, and associated maintenance concerns. This also removes the refrigerated piping from under the corners at the header trench end, which is susceptible to frosting and slip hazards.

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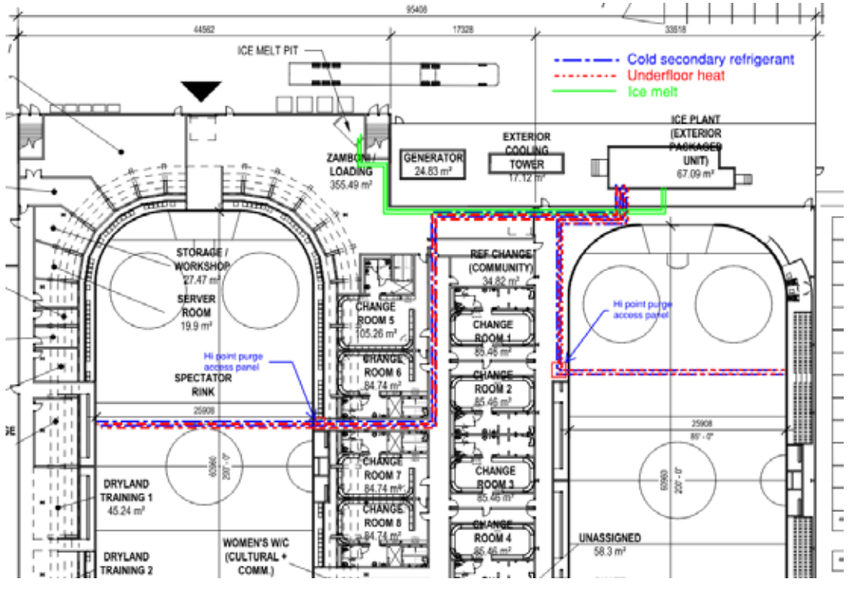
Thermo Carb Ltd.	Spruce Grove Civic Centre Schematic Design Refrigeration	The City of SPRUCE GROVE
REV.0	March 25, 2022	Page 4 of 4

SUSTAINABILITY

As a natural refrigerant ammonia is not affected by global treaties and protocols such as the Montreal or Kyoto Protocols which limit the production of ozone depleting gases and greenhouse gas emissions. This provides security to the owner that ammonia will not be phased out in the future for environmental reasons, resulting in an expensive retrofit.

DESIGN SKETCHES

Proposed Piping Layout



THERMOCARB LTD. 2022

Appendix F Electrical Design Brief

CIVIC CENTRE

Spruce Grove Civic Center

Electrical Schematic Design Report

SMP Project No: 21-04-0109

March 31, 2022

Submitted By:

SMP Engineering
Suite 101, 10835 – 120 Street NW
Edmonton, AB • T5H 3P9

Derek Ciezki • Partner
Nick Dang • Associate
William Lo • P.Eng

EXECUTIVE SUMMARY

The design for the Spruce Grove Civic Centre will be done in accordance with the various local standards and codes, and based upon energy efficient design best practices. The electrical design for the building includes, but is not limited to, the following: Power distribution design and branch circuitry, lighting design and control, and auxiliary systems design.

Lighting throughout the building will be designed to provide a warm and inviting atmosphere while accenting and enhancing architectural features and all meeting Owner requirements. Light sources throughout the facility are expected to be LED, which will work in conjunction with the BMS and low voltage lighting control systems (including various daylighting and occupancy sensors) so as to reduce unnecessary energy consumption as much as possible.

The power distribution throughout the facility will be done primarily with 600V to reduce line losses and decrease conductor sizes. An exterior diesel-powered backup generator is proposed to be installed to service mechanical loads along with any Owner-specified loads.

Communication rooms will be located strategically throughout the building in order to limit wire distance to the end devices. A fibre backbone will be provided as a distribution medium for the building IT infrastructure, while the general communication cabling will be CAT6.

The security system will be designed with a high amount of Owner input, and is anticipated to be comprised of intrusion detection, card access system, and CCTV cameras.

Select areas will have sound, A/V, and display systems designed to suit the Owner's needs and requirements.

1 ELECTRICAL STANDARDS AND GUIDELINES

1.1 Electrical Design

.1 Electrical design will comply with the following standards and guidelines:

- Safety Codes Act
- Canadian Electrical Code, Part 1 CSA C22.1-12 (22nd Edition)
- Alberta Building Code (most current edition)
- "Fire Protection Engineering Standards of the Fire Commissioner of Canada for Fire Alarm System Requirements"

- Canadian Standards Association (CSA)
- Illuminating Engineering Society of North America (IESNA)
- Institute of Electrical and Electronic Engineers (IEEE)
- ASHRAE/NECB Standards
- City of Spruce Grove Standards

2 INTRODUCTION

Electrical systems for complexes of this nature tend to be categorized into three (3) parts; Power and Distribution, Lighting and Lighting Controls, and Auxiliary Systems.

Power and Distribution is generally comprised of the following:

- Utility Incoming Service
- Main Distribution Panelboard
- Transformers
- Distribution/Branch Panelboards
- Motor Control Centres
- Emergency Power
- Grounding
- Wiring Devices
- Miscellaneous System(s)

Lighting and Lighting Controls are generally comprised of the following:

- Exterior Luminaires
- Interior Luminaires
- Exit Signage/Emergency Lighting
- Lighting Controls

Auxiliary Systems are generally comprised of the following:

- Telephone/Data Systems
- Fire Alarm System
- Security System
- Sound and A/V Systems
- Displays/Electronic Message Boards/Miscellaneous Equipment

This report provides an overview of the Electrical systems for this facility identifying key issues to foster discussion on user requirements and preliminary cost analysis. A general specification is included for basic materials and methods.

3 GENERAL – POWER & DISTRIBUTION SYSTEMS

3.1 Service

It is proposed that a new 1600A, 347/600V, 3-phase, 4-wire system be provided from a utility pad-mounted transformer at the site. This main distribution will be sized to allow for future expansion, and spare ducts will be installed with the incoming service to allow for future feeders to be incorporated.

Based on a preliminary review of the electrical equipment required, a minimum 3200mm x 10100mm main electrical room will be required; the proposed room size is subject to change as additional information is provided during design development and detailed design.

Based on the current usergroup requirements, three secondary electrical rooms would be required to reduce the effects of voltage drop, facilitate maintenance and accommodate future growth. The secondary electrical rooms shall be a minimum of 2550mm x 3400mm.

3.2 Main Distribution Panel

The main distribution panel (MDP) will be located in the main electrical room on the ground floor, with appropriate equipment for utility metering. The distribution equipment will be supplied and manufactured to accommodate the metering supplied and installed by the utility.

Central power distribution will be provided at 347/600V, 3-phase, 4-wire to reduce line losses and installation costs for feeders and conduit, as well as to improve performance for larger power loads. All such distribution will be sized to allow future growth and be complete with a surge protection to reduce transient noises and protect against power surges.

3.3 Transformers

Dry-type step-down transformer will provide 120/208V, 3-phase, 4-wire power onto a central distribution panels (CDPs), which will feed distribution panelboards that serve various systems in various parts of the complex.

3.4 Distribution/Branch Circuit Panelboards

All panelboards will be sized and located in areas to allow for proposed power demands and future circuitry. Panelboards used to provide service to computer equipment will be complete with Transient Voltage Surge Suppression (TVSS) filters to protect against power surges and transient noises. As well, all circuitry feeding such equipment will have separate neutrals with each circuit to further reduce 'dirty power'.

3.5 Motor Control Centres

Motor control centres (MCCs) will be located in mechanical rooms. The MCCs will incorporate low voltage and single-phase sensing to protect motors during power line disturbances. MCCs will also contain motor starter equipment to facilitate control of motors by the building management system (BMS).

For all other mechanical equipment not requiring speed control, magnetic starters complete with electrical disconnects will be utilized. Phase-failure protection will also be incorporated for all motors and starters.

3.6 Emergency Power

Emergency power for the facility will consist of a 250kW diesel-powered exterior generator. Emergency loads will include, but not be limited to, elevator load(s), select mechanical, fire pump and main communication &IT room loads. In addition, further discussion with the Owner is required to determine if the ice plant equipment and emergency lighting will be required to be supported by generator power. Final sizing shall be determined once final loads have been confirmed.

To integrate the generator with the power distribution system, two (2) automatic transfer switches (ATSs) will be provided as required by code to service life safety and non-life safety loads separately.

3.7 Special Power Systems for Ancillary Equipment

There is currently no requirement for a facility-wide uninterruptable power supply (UPS), however there will be local UPS included specifically for the IT and security system, integrated with the head-end IT and security panel and power supply.

3.8 Grounding

A proper grounding system will be installed to provide a low impedance path for electrical system faults and for reduction of potential shock hazard, as well as having a clean ground reference point for the proper operation of communication and data networks.

The grounding system will consist of a ground grid installed outside the building structure, which will be interconnected with the facility's overall power distribution system.

3.9 Wiring Devices

For wiring devices, all convenience receptacles throughout the space will be 20A (5-20R) unless otherwise specified. Any such receptacles at counter- or table-height for use by general users will be specified.

GFCI receptacles will be installed in the vicinity of sinks and showers, as well as any other areas exposed to moisture.

3.10 Miscellaneous System(s)

EV charging stations empty conduit infrastructure will be implemented to allow for future stations to be installed to approximately 30%-50% of approximately 600 stalls. Further coordination with City's EV strategy consultant required. A series of in ground pull boxes will be installed throughout the site connecting these empty to allow for future cabling/equipment installation. Further discussion with Owner's EV consultant to determine locations of EV.

4 GENERAL – LIGHTING AND LIGHTING CONTROLS

All lighting for the facility (interior and exterior) will be LED-based.

4.1 Exterior Lighting

The exterior lighting will be designed to create a secure environment and to enhance the facilities night appearance with the lowest energy consumption and maintenance methods available, while adhering to IESNA recommendations, Dark Sky requirements, and any specific Owner requirements.

Exterior lighting will include site and area lighting for the parking lot and any pedestrian walkway areas, and building-mounted lighting for both egress/safety purposes as well as for accent and 'wow factor' purposes.

All exterior luminaires will be chosen to provide maximum protection against vandalism and be controlled via photo-electric cell in conjunction with the building management system (BMS). Additional lighting controls will be provided throughout the parking lot area that reduce the lighting level from 100% to 50% when unoccupied.

The intent is for pedestrian routes to be provided with pole-mounted luminaires (min. 3,500mm poles), while parking lot pole-mounted luminaires will be on 900mm concrete bases (min. 7,925mm poles).

The light pole design will match the Architectural square site poles used to support wayfinding/other auxiliary devices to maintain a unified look and also to tie together the Transit Centre south of the Civic Centre.

4.2 Interior Lighting

The interior lighting will be designed to provide a warm and inviting atmosphere, with the lighting designed to reflect the needs of the area they have been

installed in, while adhering to IESNA recommendations and any specific Owner requirements.

Interior lighting will include general ambient lighting for all areas, select accent and decorative lighting for building enhancement as well as artwork, and exit and emergency lighting.

Luminaire selection will be based on several key factors including vandalism, performance and architectural appearance to improve life cycle, reduction of maintenance, and improved energy performance, amongst others. Careful consideration will especially be given to both the luminaires selected and in optimizing the lighting layout for areas where maintenance will be difficult and costly, such as the Theatre and Rink.

Lighting in computer rooms, library and office areas, where reduced glare on screen and visual comfort is important, will be done generally with indirect/direct linear fixtures unless ceiling height is restricted and then recessed fixtures will be installed.

Lighting in mechanical and nonpublic areas will be done generally with LED strip lights c/w wire guards.

Expected lighting levels for the various areas of the building are listed below. Light levels and uniformity ratios will be consistent with IES recommendations unless a specific program requirement dictates otherwise.

Description	Average lighting level
Public circulation	200 lux (20 fc)
Hockey Rink	1500 lux (150 fc)
Library	350 lux (35 fc)
Arts Gallery	350 lux (35 fc)
Change Room	150 lux (15 fc)
Offices/Meeting/Conference Room	300 lux (30 fc)
Washroom	150 lux (15 fc)
Electrical/Mechanical/Janitor	150 lux (15 fc)
Parking lot and pedestrian walkways	10-20 lux (1-2 fc)

4.3 Exit Signage/Emergency Lighting

Exit signage will adhere to most current code requirements.

Emergency lighting will be provided via battery packs and remote heads to provide ease of maintenance and installation. Further discussion with the Owner is required to determine emergency lighting will be required to be supported by generator power.

Luminaires in areas where they may be subject to abuse or exposed to a harmful environment will be specified to be complete with the appropriate guards or protective covers.

4.4 Lighting Controls

A lighting control system will be used throughout the facility that utilizes the BMS and master-switching type controls, while also allowing for individual/manual-override controls in select areas (offices, meeting rooms, etc.).

While the lighting control system will include networking/connections to the BMS, master-level switching, and manual switching, it will also include various sensor controls such as occupancy and/or vacancy sensors and daylighting sensors for the appropriate spaces so as to reduce the energy usage of the facility while also maximizing the lifetime of the luminaires.

Specialized lighting controls (multi-level; multi-scene) will be provided in select spaces requiring them, such as gathering spaces that will be used for presentation purposes and meeting rooms.

5 GENERAL – AUXILIARY SYSTEMS

Auxiliary systems are an adjunct to the efficient operation of any facility and, as such, should be relatively flexible to accommodate any changes that administrative functions dictate.

5.1 Overall Communication Infrastructure

It is intended for this facility to have its own new incoming telephone, data, and coaxial television services; however, it is also intended for there to be some degree of interconnectivity between the new facility and other existing City of Spruce Grove facilities in terms of the remote/cloud-based communication and security systems.

The new incoming services will enter the building via underground conduit facility's demarcation point located in the main communication room. The services will be sized by the utilities to accommodate estimated needs as well as a future growth of approximately 40% (this growth is anticipated due to increased use of global area network capabilities). It is anticipated that the incoming services will be via fiber for main services, and copper cabling for elevator/fire alarm monitoring or other equipment requirement copper

connection. This demarcation point will be designated for all Stakeholder communication connection point. Furthermore, this main communication room will the main communication room for the City of Spruce Grove head-end equipment.

Due to the size of the facility, the various Stakeholders communication/data requirements, the number of potential cabling required and security purposes, it is preferred that each Stakeholders have dedicated IT rooms to meet these requirements. There are four (4) various Stakeholders: City of Spruce Grove, Spruce Grove Saints, Library and Allied Arts Council.

With the dedicated IT rooms, it is intended these rooms are all connected via fiber back to the main communication room to reduce Cat6 cabling requirements and for future proofing. In addition to the fiber connection, extra empty conduit system will also be implemented between the IT rooms.

In addition, the IT rooms for The Spruce Grove Saints, Library and Allied Arts Council will have empty conduit c/w pull stings/pull boxes implemented from the main communication room to these IT rooms to allow pathways for the Stakeholder to have their own service provider for its communication requirements.

Based on a preliminary review of the communication infrastructure and equipment required, a minimum 3200mm x 3200mm main communication room will be required; This shall allow for main telecomm utility demarks. There shall be adequate space for two four-post data racks, and wallspace for access control and CCTV equipment as discussed further below. The proposed room size is subject to change as additional information is provided during design development and detailed design.

A further additional three secondary communication rooms, minimum 31000mm x 2000mm, will be required to ensure communication cabling lengths comply with TIA/EIA-568 standards. Each secondary communication room is sized for one four-post data rack.

Secondary communication rooms and spaces for The Spruce Grove Saints, Library and Allied Arts Council will require further investigation to determine the exact locations and sizes but are to be wholly separate from the City of Spruce Groves main communication room and three secondary communication rooms.

5.2 Telephone/Data Systems

For the voice and data system, fiber cabling will be run to connect to individual data/communication closet. All other communication cabling installed will be Category 6 (installed to E1A/T1A568A standards).

Cabling organization and racks, patch panels, and patch cables will be included. Any specifics additional equipment will be determined in conjunction with the Owner's IT representative. Each Stakeholder will be responsible for their own IT head-end equipment.

All cablings will be installed in either conduit or cable tray to allow for accessibility and future maintenance and modification.

The facility will deploy a VOIP system. Any data outlet locations for computers, phones, wireless access points, scanners, displays, cameras, help phones, and other equipment requiring data will be completed with two (2) data RJ-45 connection to allow for redundancy in the event of a cable failure.

Wireless access points (WAPs) will be provided throughout the facility general areas, as well as in select specialized areas as directed by the Owner.

5.3 Fire Alarm System

The Fire Alarm system will be a microprocessor-based addressable system for the overall facility. A single-stage fully addressable fire alarm system will be installed in conjunction with the sprinkler system. This type of system allows for easy identification of each device or equipment activated, self-monitoring for ground fault and wiring supervision, and reduced installation costs in conduit and wiring.

The system will be comprised of a main fire alarm control panel, with remote annunciators at each principal entry.

This system will be installed with horn/strobe system that will allow for building wide signaling if the fire alarm system has been activated.

The system will have installation of system detectors in any un-sprinklered areas, manual (pull) stations at all egress doors and between floor areas, a connection to monitor the sprinkler system, emergency power, magnetic door releases as required, and provision to provide a signal to a monitoring company or fire alarm department.

5.4 Security System

A complete security system will be supplied and installed which will include door security hardware (including card readers), reception/'control checkpoint' devices, motion detectors and other intrusion alarm devices, closed-circuit television (CCTV) cameras, and the appropriate head-end equipment (control panel(s), power supplies, etc.).

CCTV cameras will strategically place to ensure the spaces are covered to provide public safety and security. In addition, exterior cameras will be implemented around the building to cover parking areas, entrances (including

arena entrance), exterior Library space, back area mechanical and electrical equipment.

The system will match the City's standard to use the Genetec and the Axis system to maintain consistency of the City's overall security system. This system will be managed by the City of Spruce Grove including key fob/schedule management for all Stakeholders' space.

All service doors, including the mechanical room will have card access requirements.

It is expected for there to be a UPS included specifically for the security system, integrated with the head-end security panel and power supply.

All conductors will be installed in conduit, and the security system will allow for monitoring of fire alarms, the mechanical HVAC system, and any other systems as directed by the Owner.

5.5 Paging/Intercom and Sound Systems

The paging/intercom system as well as audio-visual/sound system will be achieved via a distributed speaker system which will extend throughout the entirety of the facility, including allowance for wireless microphones for the rinks.

A distributed sound system complete with individual controls will be installed in the rink with controls and functionality as per the Owner's requirements.

The system will be interconnected to allow for an "All-Call" operation or other emergency audio notifications. This main system will be integrated to fire alarm system to allow it to override the sound system in the event of fire alarm is activated.

Further discussions will be required to determine each Stakeholder's specific requirements.

AV systems network will be separated from all other network and equipment will be in a dedicated AV room, minimum 2600mm x 3100mm.

5.6 Displays/Electronic Message Boards/Miscellaneous Equipment

Provisions will be made to allow for television or electronic displays, electronic message boards, and other such miscellaneous equipment at various locations throughout the facility, including all principal entrances.

Provisions will also be made to allow for an interior security 'checkpoint' type of system for implementation at the reception and/or security desk location(s) so as to monitor and control the flow of users having access to select areas.

6 INDIVIDUAL USER GROUP GUIDELINES

6.1 Arena Areas

Rink:

Special consideration will be given to lighting in the rink. It is proposed a lighting system complete with zone controller will be installed to provide multilevel lighting. Lighting will be done using suspended high bay LED fixtures complete with prismatic lens and wire guard. The lighting levels will be designed to meet the Professional IES Facility Class of Play. This also allows for broadcasting lighting level requirements.

Both rinks will have high end sound systems complete with wireless microphones for special events and to assist in training and teaching. The arena sound system will be designed to allow for spectators and special event needs.

A cable and/or conduit system will be installed in a network fashion, and are to be of sufficient size to allow for easy addition and relocation.

General 20A convenience outlets around the arena will be installed for light use during an event or housekeeping.

In addition, a power connection box/point will be installed on the exterior of the building by the rink to allow for special events in the cases where the venue will be bringing in their own portable power for any rink level power connections.

Power, data and AV will be made for score clock connections. Further discussions requirements to determine interconnections requirements.

Press Box:

A dedicated 100A, 120/208 volt distribution panel will be power for power and lighting. General outlets will be installed around the room for convenience. General lighting will be dimmable controls will be implemented.

Support Spaces for Studio/Media:

General outlets will be installed around the room for convenience. General lighting will be dimmable controls will be implemented.

Additional power and data outlets will be installed for printers/scanners as required.

Concession:

A 200A 120/208 volt distribution panel will be installed to provide power for power and lighting. Specific outlets will be required to suit the special equipment supporting the space. Power and data will be provided for, signage, cash registers, scanners, etc.

CCTV camera(s) will be installed to monitor the room.

6.2 Library

The lighting within the space will be provided by long life, energy efficient, low maintenance system to provide a bright well-lit ambience to assist in the overall appearance of the new facility. All fixtures will be suitably located to permit adequate levels between and as even as possible distribution to the bottom of each stack. Lighting levels, switching and style will be appropriate to allow for a variety of tasks and glare control to meet the user's requirements.

Convenience power will be provided throughout the library and circuitry where computer equipment will be complete with separate neutral.

Power and control will be provided for automatic door openers, fax, signage, machines, cash registers, photocopy machines, scanners, etc. In addition, floor outlets will be place throughout to provide flexibility for spontaneous programming.

In floor low voltage power and data will also be provided for RFID gates at entrances. Data will be connected back to the Library's network.

Power and data provisions will be made to allow for three (3) digital displays, computers and printing equipment.

CCTV cameras will be installed to monitor the facility during unstaffed hours.

6.3 Theatre

The general lighting system for the theatre will comprise of dimmable LED lighting in combination with dimmable control to provide multi-level light intensity. Furthermore, track lighting will be provided to select areas around the stage for

light performance, multipurpose and non-theatrical events. Warm, directional lighting will also be provided for walls where art/paintings are hung.

Convenience power and data will be provided throughout the theatre and circuitry where computer equipment will be complete with separate neutral.

Power and data will be provided for signage, cash registers, etc.

Power and data outlets will be provided in ceiling for projectors and wall screens. Power will also be provided for power screens complete with controls. In addition, floor outlets will be place throughout to provide flexibility.

Additional power and data outlets will be provided throughout to support portable theatre lighting and AV equipment. Conduit/Cable tray pathways will be provided to allow for cabling management for this portable system. Further discussions will be required to determine final placement of conduit/tray.

Camera over the art instruction station in the program room will be provided. Further discussions will be required to determine connections and intent.

Data will be connected back to the Theatre's network.

7 SUSTAINABILITY

One of the keys in the overall design will be providing electrical systems that allow for future adaptability, not only in terms of power capacity but in terms of the lighting controls, the voice/data system, the security system, and sound and display systems.

The use of LED lighting technology will help reduce the overall energy footprint of the complex, as well as the use of various sensors and an integrated lighting control system will serve to minimize the energy demands of the lighting system.

In additional, empty conduit system will be designed to allow for future EV charging stations that will promote use of green vehicles.

8 COMMISSIONING

Commissioning will include, but not be limited to, MCC, security/door access, intra-facility communication system, lighting controls, and identification and balancing of panels.

9 OUTLINE SPECIFICATIONS

9.1 General Provisions

CIVIC CENTRE

.1 Work Included:

.1 Applicable systems include:

.1 Incoming power, telephone and cable TV services and utility co-ordination.
.2 Complete electrical distribution system including main switchboard and sub-distribution with provision for metering, feeders, distribution with provision for metering, feeders, distribution panel, branch circuit panels, branch circuits, etc.
.3 Telephone distribution raceway system, outlet boxes and termination panels.
.4 Cable television distribution raceway system.
.5 Complete fire alarm system.
.6 Complete emergency and exit lighting system.
.7 Complete grounding and ground fault system where required,
.8 Power and telephone to elevator motors and controllers.
.9 Exterior site lighting and building security lighting.
.10 Interior lighting.
.11 Interior and exterior lighting control.
.12 Electrical connections of all mechanical, plumbing and owner furnished equipment.
.13 Complete Security system
.14 Computer/data system raceway system.
.15 Switches, receptacles and special outlets as noted herein.
.16 Testing of all systems, equipment and conductors.
.17 Co-ordination with all other trades.

.2 Work or items not Proposed by Division 26, or Included in Other Work:

.1 The owner will pay for electrical primary and secondary costs charged by the Utilities.
.2 Primary utility cable to be furnished and installed by the Utilities.
.3 Secondary cable to be furnished by Electrical Contractor. Connections at transformer by utility, at secondary switchgear by Electrical Contractor.
.4 Package starters for elevators by Mechanical/Controls Contractor.
.5 Installation of data, telephone, security, sound equipment by Owner's IT/AV/Security representative or Contractor, unless noted otherwise.
.6 HVAC temperature control wiring by Mechanical/Controls Contractor.
.7 Sprinkler flow switches and valve tamper monitors.
.8 Package starter units for air compressors, fire pump and water pumps by Mechanical/Controls Contractor.

.9 Irrigation controllers and low voltage wiring for control valves by Mechanical/Controls Contractor.
.10 Electric door hardware by Owner's Security Contractor.
.11 Telephone system, wiring, and switchboards by Owner's IT representative.

.3 Reference Standards and Codes:

.1 Current Canadian Electrical Code.
.2 Current Alberta Building Code.
.3 Current National Fire Protection Act.
.4 Inspection Program Requirements: (CSA 7299.4).
.5 ULC – S524 – M1987 (Standard for Installation of Fire Alarm Systems).
.6 Current Fire Code.
.7 Local Requirements from:

.1 Electrical Inspection Branch
.2 Alberta Standards
.3 City of Spruce Grove Planning Department
.4 Telus Communications Inc.
.5 Supernet
.6 Bell
.7 Fortis

.8 EEMAC (Electrical and Electronic Manufacturer's Assoc. Council).
.9 EIA/TIA 568A Standards.

9.2 Basic Materials and Methods

.1 Raceways:

.1 Schedule 40 PVC for underground services, feeders, branch circuits and underground signal runs.
.2 EMT for exposed feeders and branch circuit conduits and for communication conduits.
.3 Rigid steel for exposed conduits where exposed to weather and/or subject to physical damage.
.4 Flexible conduit will be used for motor connections. (max 450mm), transformer connection (max 450mm), recessed lighting fixtures (max 1800mm). Liquid tight for all connections in mechanical rooms, where water lines is present.

.2 Wiring and Cable:

.1 Insulated copper 600V, solid #10 AWG and smaller, stranded for #8 and larger. Aluminum conductors will be considered for feeders #1 and larger.

.2 Minimum #12 AWG, except runs over 33m to be #10 AWG.
.3 Junction Boxes:

.1 Sheet metal for interior use.
.2 Cast for exterior use.
.3 Concrete for exterior use.

.3 Wiring Devices:

.1 Receptacles – 15A, 125V, duplex, grounding type, convenience outlets, specification grade
.2 Switches – 15A, 120V, quiet type, specification grade

.4 Panelboards:

.1 Bolt on moulded case circuit breakers.
.2 Aluminum bus.
.3 10,000A IC minimum rating for 120/208V panels.

.5 Distribution Switchboards:

.1 Bolt on circuit breakers and fused switches.
.2 Aluminum bus bars.
.3 EEMAC 1 enclosure.
.4 Components braced for and rated for available short circuit current.

.6 Dry Type Transformers:

.1 600 – 208/120V 3-phase, 4 wire, delta-wye.
.2 Dry type, class H insulation.
.3 Secondary wye connection grounded.
.4 Harmonic Mitigation
.5 100mm concrete housekeeping pad under transformer

9.3 General Guidelines and Standards

1. Main Service	Characteristics	25 kV, incoming service from utility to a main pad-mount utility supplied transformer. The transformer will reduce voltage to 347/600V for distribution throughout the complex from a 1600A switchboard c/w utility metering for each user

		group.
	Interrupting Rating	48,000A
	Power Factor Correction	Individual at designed loads
	Ground Fault Protection	Over 1,000A feeders
	T.V.S.S.	At selected locations
2. Load Expansion Capacity	40%	
	Space for future	4 @ 400A in each
	Sub-feeders	347/600V sub distribution board
3. Metering	Utility plus customer digital	
4. Main Service Conductors Distribution System		Copper, Aluminum will be considered
5. Main Distribution Risers Bus Switches Breakers		Copper, Aluminum will be considered
6. Building Dry Type Transformer		K-13
7. Kiosk Dry Type Transformer	Standard	
8. Lighting Panels	Bolt in circuit breaker, 347/600 and/or 120/208V.	
9. Power Panel	120/208V bolt in circuit breaker	
10. T.V.S.S.		Incoming and CDP
11. Panel Feeders Under 100A		Copper
12. Panel Feeders Over 100A		Copper, Aluminum will be considered
13. Major Mechanical Feeders		Copper
14. Chiller Feeders		Copper
15. Fire Rated Feeders		Pyrotenax
16. Separate Neutrals for Computer Circuits		Yes
17. Exterior Lighting	General	LED
	Security	Yes
	Decorative / Flood Lighting	Yes
	Control	Photocell & Time Clock BMS
	Voltage	120V

18. Parking Lot Lighting	General	LED
	Levels	1 – 3 f.c.
	Control	LV/BMS and/or sensor
	Voltage	120V
19. Service Spaces Lighting	General	LED linear direct/indirect and/or downlighting
	Levels	IES
	Control	Switch and/or sensor
	Voltage	120V
20. Public Lobbies Lighting	General	LED linear direct/indirect and/or downlighting
	Levels	10 – 40 f.c.
	Control	BMS/LV
	Voltage	120V
21. User Group Lighting	General	LED linear direct/indirect and/or downlighting
	Levels	Varies
	Control	LV/BMS/switches/sensor
	Voltage	120V
	Lamps	Varies
	Driver	120V electronic
	THD	Less than 10%
22. Low Voltage System		Plug-in Relays
		Local Control
		Cleaning Switch
		Sweep/Off Function
		Typical Floor
23. Service Entry Data/Telephones		Underground
		Copper
		Fiber
24. Demarcation Rooms Data/Telephones		Yes

Spruce Grove Transit Centre

Electrical Design Development Report

SMP Project No: 21-04-0109

March 31, 2022

Submitted By:

SMP Engineering
Suite 101, 10835 – 120 Street NW
Edmonton, AB • T5H 3P9

Derek Ciezki • Partner
Nick Dang • Associate
William Lo • P.Eng

H:\5850 - 5899\5855 Spruce Grove Civic Centre\1.0 Project Administration\1.10 Program Documents & Design Reports\Schematic Design Report - Civic Centre\Content\Consultants\Electrical\0109-Schematic Design Report-TC (Electrical).Doc

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EXECUTIVE SUMMARY

The design for the Spruce Grove Transit Centre will be done in accordance with the various local standards and codes, and based upon energy efficient design best practices. The electrical design for the building includes, but is not limited to, the following: Power distribution design and branch circuitry, lighting design and control, and auxiliary systems design.

Lighting throughout the centre will be designed to provide a warm and inviting atmosphere while accenting and enhancing architectural features and all meeting Owner requirements. Light sources throughout the facility are expected to be LED, which will work in conjunction with the BMS and low voltage lighting control systems (including occupancy sensors) so as to reduce unnecessary energy consumption as much as possible.

The power distribution for the station will be done with 208V three phase.

Communication head-end c/w lockable cabinet will be located in the same room as the electrical panel and security panels due the size of this facility. The general communication cabling will be CAT6.

The security system will be designed with a high amount of Owner input, and is anticipated to be comprised of intrusion detection, card access system, and CCTV cameras.

1 ELECTRICAL STANDARDS AND GUIDELINES

1.1 Electrical Design

.1 Electrical design will comply with the following standards and guidelines:

- Safety Codes Act
- Canadian Electrical Code, Part 1 CSA C22.1-12 (22nd Edition)
- Alberta Building Code (most current edition)
- "Fire Protection Engineering Standards of the Fire Commissioner of Canada for Fire Alarm System Requirements"
- Canadian Standards Association (CSA)
- Illuminating Engineering Society of North America (IESNA)
- Institute of Electrical and Electronic Engineers (IEEE)
- ASHRAE/NECB Standards
- City of Spruce Grove Standards

2 INTRODUCTION

Electrical systems for facility will be categorized into three (3) parts; Power and Distribution, Lighting and Lighting Controls, and Auxiliary Systems.

Power and Distribution is generally comprised of the following:

- Utility Incoming Service
- Main Distribution Panelboard
- Distribution/Branch Panelboards
- Grounding
- Wiring Devices
- Miscellaneous System(s)

Lighting and Lighting Controls are generally comprised of the following:

- Exterior Luminaires
- Interior Luminaires
- Exit Signage/Emergency Lighting
- Lighting Controls

Auxiliary Systems are generally comprised of the following:

- Telephone/Data Systems
- Security System
- Sound and A/V Systems
- Displays/Electronic Message Boards/Miscellaneous Equipment

This report provides an overview of the Electrical systems for this facility identifying key issues to foster discussion on user requirements and preliminary cost analysis. A general specification is included for basic materials and methods.

3 GENERAL – POWER & DISTRIBUTION SYSTEMS

3.1 Service

A new enclosed electrical room, containing only electrical equipment, communication and security equipment, will need to be provided. Further coordination between the City of Spruce Grove, Architect, and Mechanical Consultant will be required.

Based on a preliminary review of the electrical equipment required, a minimum 3300mm x 2400mm electrical room will be required; the proposed room size is subject to change as additional information is provided during design development and detailed design.

3.2 Main Distribution Panel

The main distribution panel is to have a 400 Amps bus complete with electronic trip breaker set at 200 Amps. Further coordination with the mechanical consultant will be required to confirm the final size of the new electrical service.

3.3 Special Power Systems for Ancillary Equipment

There is currently no requirement for a facility-wide uninterruptable power supply (UPS), however there will be local UPS included specifically for the IT and security system, integrated with the head-end IT and security panel and power supply.

3.4 Grounding

A proper grounding system will be installed to provide a low impedance path for electrical system faults and for reduction of potential shock hazard, as well as having a clean ground reference point for the proper operation of communication and data networks.

The grounding system will consist of a ground grid installed outside the building structure, which will be interconnected with the facility's overall power distribution system.

3.5 Wiring Devices

For wiring devices, all convenience receptacles throughout the space will be 20A (5-20R) unless otherwise specified. Any such receptacles at counter- or table-height for use by general users will be specified.

GFCI receptacles will be installed in the vicinity of sinks and showers, as well as any other areas exposed to moisture.

4 GENERAL – LIGHTING AND LIGHTING CONTROLS

<u>All lighting for the facility (interior and exterior) will be LED-based.</u>

4.1 Exterior Lighting

The exterior lighting will be designed to create a secure environment and to enhance the facilities night appearance with the lowest energy consumption and maintenance methods available, while adhering to IESNA recommendations, Dark Sky requirements, and any specific Owner requirements

Exterior lighting will include site and area lighting for the parking lot and any pedestrian walkway areas, and building-mounted lighting for both egress/safety purposes as well as for accent and 'wow factor' purposes.

All exterior luminaires will be chosen to provide maximum protection against vandalism and be controlled via photo-electric cell in conjunction with the building management system (BMS). Additional lighting controls will be provided throughout the parking lot area that reduce the lighting level from 100% to 50% when unoccupied.

The intent is for pedestrian routes for staff and students to be provided with pole-mounted luminaires (min. 3,500mm poles), while parking lot pole-mounted luminaires will be on 900mm concrete bases (min. 7,925mm poles).

The light pole design will match the Architectural square site poles used to support wayfinding/other auxiliary devices to maintain a unified look and also to tie together the Civic Centre north of the Transit Centre.

4.2 Interior Lighting

The interior lighting will be designed to provide a warm and inviting atmosphere, with the lighting designed to reflect the needs of the area they have been installed in, while adhering to IESNA recommendations and any specific Owner requirements.

Interior lighting will include general ambient lighting for all areas, select accent and decorative lighting for building enhancement, and exit and emergency lighting.

Luminaire selection will be based on several key factors including vandalism, performance and architectural appearance to improve life cycle, reduction of maintenance, and improved energy performance, amongst others. Careful consideration will especially be given to both the luminaires selected and in optimizing the lighting layout for areas where maintenance will be difficult and costly.

Lighting in mechanical and nonpublic areas will be done generally with LED strip lights c/w wire guards.

Expected lighting levels for the various areas of the building are listed below. Light levels and uniformity ratios will be consistent with IES recommendations unless a specific program requirement dictates otherwise.

Description	**Average lighting level**
Washroom	150 lux (15 fc)
Electrical/Mechanical/Janitor	150 lux (15 fc)
Parking lot and pedestrian walkways	10-20 lux (1-2 fc)

4.3 Exit Signage/Emergency Lighting

Exit signage will adhere to most current code requirements.

Emergency lighting will be provided via battery packs and remote heads to provide ease of maintenance and installation.

Luminaires in areas where they may be subject to abuse or exposed to a harmful environment will be specified to be complete with the appropriate guards or protective covers.

4.4 Lighting Controls

The lighting control system will be combination of local lighting line voltage lighting controls, and low voltage relay-based control systems. All exterior lighting will be on timeclock and photocell controls.

5 GENERAL – AUXILIARY SYSTEMS

Auxiliary systems are an adjunct to the efficient operation of any facility and, as such, should be relatively flexible to accommodate any changes that administrative functions dictate.

It is intended for this facility to have its own new incoming telephone, data, and coaxial television services; however, it is also intended for there to be some degree of interconnectivity between the new facility and other existing City of Spruce Grove facilities in terms of the remote/cloud-based communication and security systems.

New underground conduits will be required to be installed from the Southwest corner of the site. There will be a 4 -100mm conduits for Fortis and 2- 100mm conduits for Telus/Bell.

5.1 Telephone/Data Systems

For the voice and data system, fibre cabling will be run to connect to individual data/communication closet. All other communication cabling installed will be Category 6 (installed to E1A/T1A568A standards).

Cabling organization and head-end equipment will include racks, patch panels, patch cables, and related equipment, the specifics of which will be determined in conjunction with the Owner's IT representative.

All cabling will be installed in either conduit to allow for accessibility and future maintenance and modification. Exterior rated cabling will be installed for public wifi or CCTV.

Wireless access points (WAPs) will be provided throughout the facility general areas, as well as in select specialized areas as directed by the Owner.

5.2 Fire Alarm System

Fire Alarm system will not be required at this Transit Centre.

5.3 Security System

A complete security system will be supplied and installed which will include door security hardware (including card readers), reception/'control checkpoint' devices, motion detectors and other intrusion alarm devices, closed-circuit television (CCTV) cameras, and the appropriate head-end equipment (control panel(s), power supplies, etc.).

It is expected for there to be a UPS included specifically for the security system, integrated with the head-end security panel and power supply.

Washrooms will be fitted with card access.

All conductors will be installed in conduit, and the security system will allow for monitoring of fire alarms, the mechanical HVAC system, and any other systems as directed by the Owner.

Help phones will be installed based on the City's CPTED report and requirements.

5.4 Paging/Intercom and Sound Systems

The paging/intercom system as well as audio-visual/sound system will be achieved via a distributed speaker system which will extend throughout the entirety of the facility.

6 SUSTAINABILITY

One of the keys in the overall design will be providing electrical systems that allow for future adaptability, not only in terms of power capacity but in terms of the lighting controls, the voice/data system, the security system, and sound and display systems.

The use of LED lighting technology will help reduce the overall energy footprint of the complex, as well as the use of various sensors and an integrated lighting control system will serve to minimize the energy demands of the lighting system.

7 COMMISSIONING

Commissioning will include, but not be limited to, MCC, security/door access, intra-facility communication system, lighting controls, and identification and balancing of panels.

8 OUTLINE SPECIFICATIONS

8.1 General Provisions

.1 Work Included:

.1 Applicable systems include:

.1 Incoming power, telephone and cable TV services and utility co-ordination.
.2 Complete electrical distribution system including main switchboard and sub-distribution with provision for metering, feeders, distribution with provision for metering, feeders, distribution panel, branch circuit panels, branch circuits, etc.
.3 Telephone distribution raceway system, outlet boxes and termination panels.
.4 Complete fire alarm system.
.5 Complete emergency and exit lighting system.
.6 Complete grounding and ground fault system where required,
.7 Power and telephone to elevator motors and controllers.
.8 Exterior site lighting and building security lighting.
.9 Interior lighting.
.10 Interior and exterior lighting control.
.11 Electrical connections of all mechanical, plumbing and owner furnished equipment.
.12 Complete Security system
.13 Computer/data system raceway system.
.14 Switches, receptacles and special outlets as noted herein.
.15 Testing of all systems, equipment and conductors.
.16 Co-ordination with all other trades.

.2 Work or items not Proposed by Division 26, or Included in Other Work:

.1 The owner will pay for electrical primary and secondary costs charged by the Utilities.
.2 Primary utility cable to be furnished and installed by the Utilities.
.3 Secondary cable to be furnished by Electrical Contractor. Connections at transformer by utility, at secondary switchgear by Electrical Contractor.

.4 Package starters for elevators by Mechanical/Controls Contractor.
.5 Installation of data, telephone, security, sound equipment by Owner's IT/AV/Security representative or Contractor, unless noted otherwise.
.6 HVAC temperature control wiring by Mechanical/Controls Contractor.
.7 Sprinkler flow switches and valve tamper monitors.
.8 Package starter units for air compressors, fire pump and water pumps by Mechanical/Controls Contractor.
.9 Irrigation controllers and low voltage wiring for control valves by Mechanical/Controls Contractor.
.10 Electric door hardware by Owner's Security Contractor.
.11 Telephone system, wiring, and switchboards by Owner's IT representative.

.3 Reference Standards and Codes:

.1 Current Canadian Electrical Code.
.2 Current Alberta Building Code.
.3 Current National Fire Protection Act.
.4 Inspection Program Requirements: (CSA 7299.4).
.5 ULC – S524 – M1987 (Standard for Installation of Fire Alarm Systems).
.6 Current Fire Code.
.7 Local Requirements from:

.1 Electrical Inspection Branch
.2 Alberta Standards
.3 City of Spruce Grove Planning Department
.4 Telus Communications Inc.
.5 Bell
.6 Fortis

.8 EEMAC (Electrical and Electronic Manufacturer's Assoc. Council).
.9 EIA/TIA 568A Standards.

8.2 Basic Materials and Methods

.1 Raceways:

.1 Schedule 40 PVC for underground services, feeders, branch circuits and underground signal runs.
.2 EMT for exposed feeders and branch circuit conduits and for communication conduits.
.3 Rigid steel for exposed conduits where exposed to weather and/or subject to physical damage.

.4 Flexible conduit will be used for motor connections. (max 450mm), transformer connection (max 450mm), recessed lighting fixtures (max 1800mm). Liquid tight for all connections in mechanical rooms, where water lines is present.

.2 Wiring and Cable:

.1 Insulated copper 600V, solid #10 AWG and smaller, stranded for #8 and larger. Aluminum conductors will be considered for feeders #1 and larger.
.2 Minimum #12 AWG, except runs over 33m to be #10 AWG.
.3 Junction Boxes:

.1 Sheet metal for interior use.
.2 Cast for exterior use.
.3 Concrete for exterior use.

.3 Wiring Devices:

.1 Receptacles – 15A, 125V, duplex, grounding type, convenience outlets, specification grade
.2 Switches – 15A, 120V, quiet type, specification grade

.4 Distribution Switchboards:

.1 Bolt on circuit breakers and fused switches.
.2 Aluminum bus bars.
.3 EEMAC 1 enclosure.
.4 Components braced for and rated for available short circuit current.

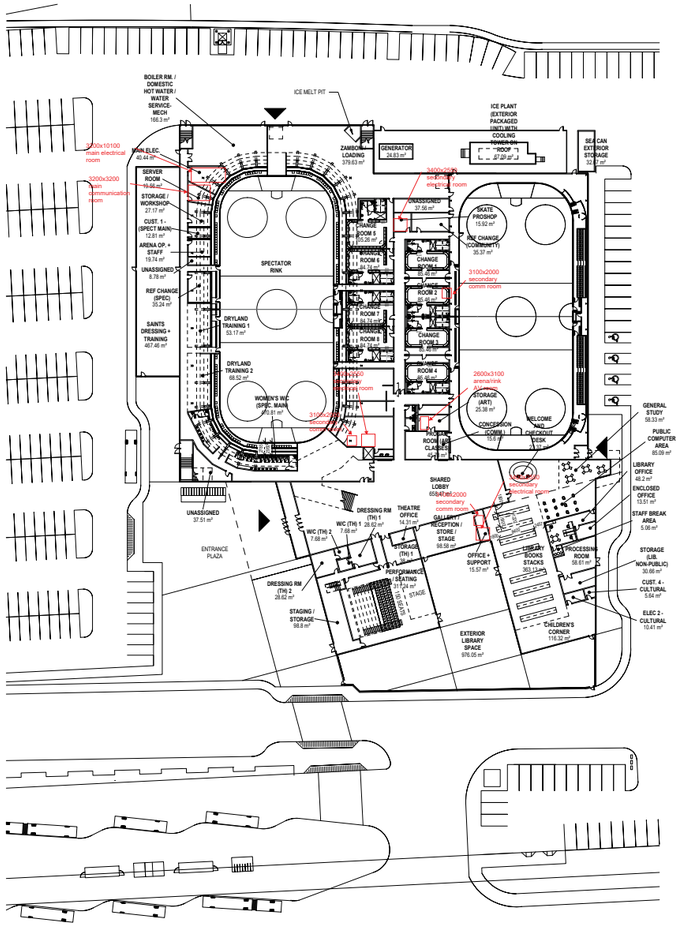
8.3 General Guidelines and Standards

1. Main Service	Characteristics	25 kV, incoming service from utility to a main pad-mount utility supplied transformer. The transformer will reduce voltage to 120/208V for distribution throughout the complex from a 400A switchboard c/w utility metering
	Interrupting Rating	48,000A
	Power Factor Correction	Individual at designed loads
2. Load Expansion Capacity	40%	
	Space for future	4 @ 100A in each
3. Metering	Utility	
4. Main Service Conductors		Copper, Aluminum will be considered
5. Panel	120/208V bolt in circuit breaker	
6. T.V.S.S.	Yes	
7. Panel Feeders Under 100A		Copper
8. Panel Feeders Over 100A		Copper, Aluminum will be considered
9. Major Mechanical Feeders		Copper
10. Chiller Feeders		Copper
11. Fire Rated Feeders		Pyrotenax
12. Separate Neutrals for Computer Circuits		Yes
13. Exterior Lighting	General	LED
	Security	Yes
	Decorative / Flood Lighting	Yes
	Control	Photocell & Time Clock BMS
	Voltage	120V
14. Service Spaces Lighting	General	LED linear direct/indirect and/or downlighting
	Levels	IES
	Control	Switch and/or sensor
	Voltage	120V
15. Service Entry Data/Telephones		Underground
		Copper
		Fiber
16. Demarcation Rooms Data/Telephones		Yes
17. User Group Distribution Data/Telephones		Conduit or Cable Tray in ceiling space

A Appendix

Appendix F Electrical Design Brief

ELECTRICAL FLOOR PLANS



3 A061 OPTION 26 -COMPOSITE- LEVEL 01
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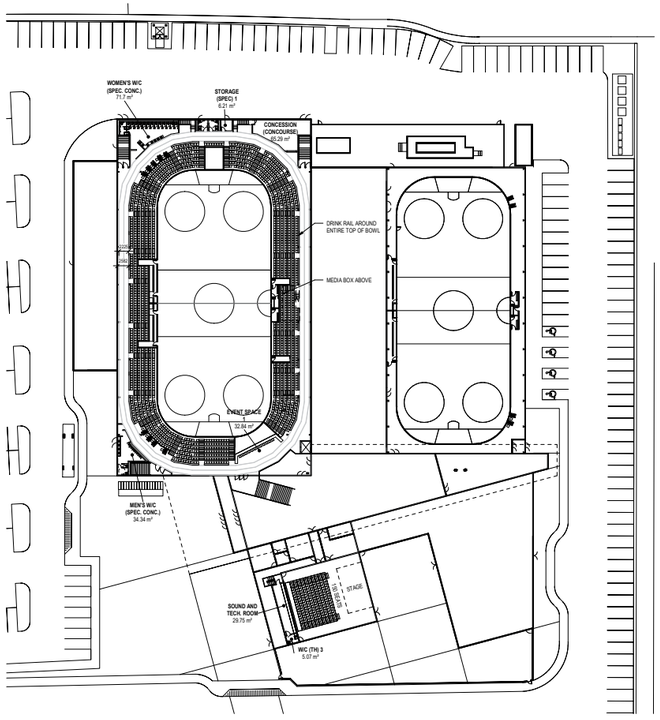
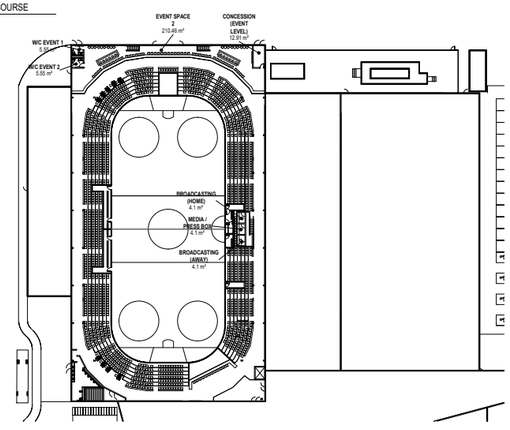


2 A061 OPTION 26 -COMPOSITE- LEVEL 02 CONCOURSE
Scale: 1 : 400



1 A061 OPTION 26 -COMPOSITE- LEVEL 03 EVENT SPACE
Scale: 1 : 400

	OPTION 24 WITH DRINK RAIL
SEATS	- 1,414 BLEACHER SEATS - 9 ACCESSIBLE SEATS - 9 COMPANION SEATS EVENT SPACE 1 - 12 PEOPLE AT LOW LOGE SEATING EVENT SPACE 2 - 47 PEOPLE AT LOW LOGE SEATING - 12 PEOPLE AT STANDING RAIL **1,503 TOTAL NUMBER OF SEATS**

OPTION 26 - GROSS FLOOR AREA		
Name	Area	Area Sqft
OPTION 26 - LEVEL 1 GFA	9710.12 m²	104518.89 ft²
OPTION 26 - LEVEL 2 GFA - SPEC.	1980.15 m²	21314.19 ft²
OPTION 26 - LEVEL 2 GFA - THEATRE	51.11 m²	550.17 ft²
OPTION 26 - LEVEL 3 - EVENT SPACE	252.69 m²	2719.88 ft²
OPTION 26 - LEVEL 3 - MEDIA BOX	29.73 m²	320.03 ft²
Grand total: 5	12023.81 m²	129423.16 ft²

gec architecture

Project Team:
Prime Consultant: GEC Architecture
Structural Consultant: RJC Engineering
Mechanical Consultant: AME Groupg
Electrical Consultant: SMP Engineering
Civil Consultant: Design Works
Landscape Consultant: Design North
Consultant Other: Thermocarb

Client: Client Name and/or Logo

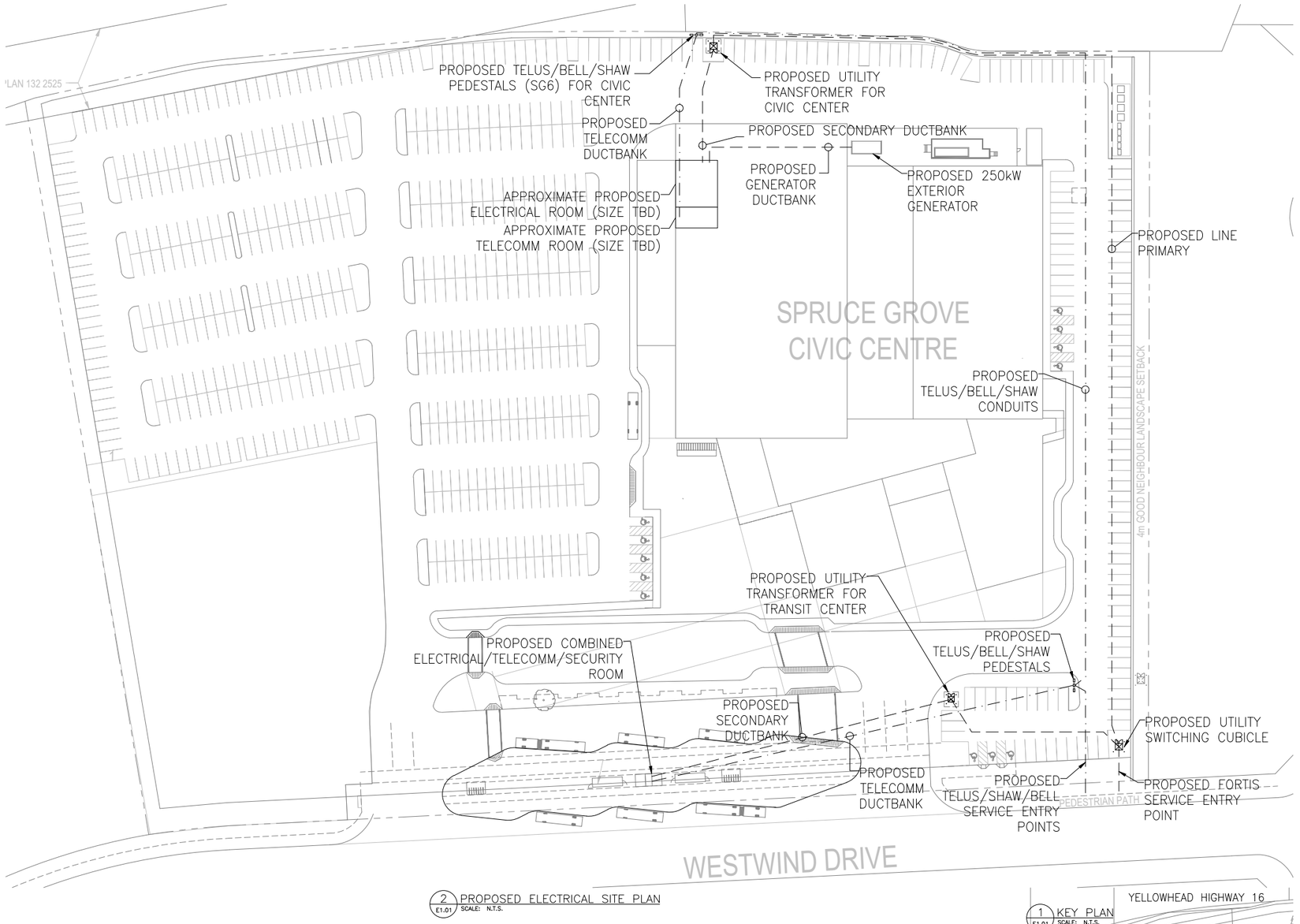
Seal & Permit

PRELIMINARY - NOT FOR CONSTRUCTION

NO.	ISSUED FOR	DATE

Drawing History
Scale: 1 : 400 | Checked By: Checker
Project: SPRUCE GROVE CIVIC CENTRE
Project Address
Drawing Title: OPTION 26
Project Number: 5855 | Drawing Number: A061

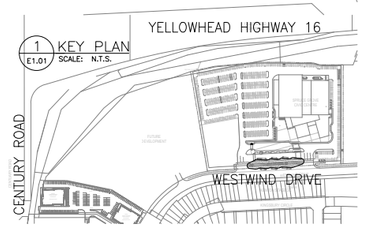
ELECTRICAL SITE PLAN



2 E1.01 PROPOSED ELECTRICAL SITE PLAN
SCALE: N.T.S.

MUNICIPAL ADDRESS
TBD
SPRUCE GROVE, AB

LEGAL ADDRESS
LOT 9 BLOCK 1 PLAN 102 7111 (OVERALL PARCEL OF LAND)



1 E1.01 KEY PLAN
SCALE: N.T.S.

gec architecture

Project Team:
Prime Consultant: GEC Architecture
Structural Consultant: RJC Engineering
Mechanical Consultant: AME Groupg
Electrical Consultant: SMP Engineering
Civil Consultant: Design Works
Landscape Consultant: Design North
Refrigeration Consultant: Thermocarb
Client
Seal & Permit

PRELIMINARY - NOT FOR CONSTRUCTION

NO.	ISSUED FOR	DATE
1	ISSUED FOR SD	03/31/2022

Drawing History
Scale: AS NOTED
Checked By: DC
Project: SPRUCE GROVE CIVIC CENTRE
Project Address
Drawing Title: PROPOSED ELECTRICAL SITE SERVICES
Project Number: 21-04-0109
Drawing Number: E1.01

Appendix G Landscape Design Brief

LANDSCAPE

LANDSCAPE REQUIREMENTS

The landscape portion for the Spruce Grove Civic Centre will be designed in accordance with City of Spruce Grove Land Use Bylaws and requirements. Landscape requirements will be based on Part 9 'Landscape Regulations' of the City of Spruce Grove Land Use Bylaw.

The site is zoned UR – Urban Reserve District. The minimum front, rear and side yard setbacks are at the discretion of the Development Authority. We are assuming a 6m wide front yard, a 1.5m wide rear yard and 4m wide side yards. A total of 2,796.67 sqm of landscaped setback area is required within the project boundary. For this area, 1 tree for every 35sqm and 1 shrub for every 15sqm of any required yard or setback shall be provided, which equals to 82 trees and 187 shrubs. In addition, 1 tree for every 20sqm and 1 shrub for every 10sqm of required parking area island shall be provided. For 639 parking stalls, 64 trees and 128 shrubs are required. In total, 144 trees and 315 shrubs are required for this site.

To provide year round colour and interest, a tree mix of approximately 30%-50% coniferous and 50%-70% deciduous shall be provided.

No existing trees are on site that can be retained.

EXISTING CONDITIONS

The proposed project area is located north of Westwind Drive and borders a residential subdivision on the east side. A narrow storm water management facility is proposed along the north property line, just south of the Highway 16 – Yellowhead Corridor.

LANDSCAPE CONCEPT

The landscape concept will be based on the architecture of the building and the anticipated pedestrian and bicycle traffic to the various building entrances. Landscape elements will contribute to make the site more attractive and integrate the building into the surrounding environment and urban fabric. The landscape concept will provide shade, screening where necessary and enhance the site aesthetically, using plant material hardy to this location.

Building entrances and important pedestrian routes will be highlighted or enhanced, guiding patrons, staff and visitors to the various entrances. Linear tree planting, groups of ornamental trees, shrub plantings and ornamental grasses will be used for this site. The main entry plaza will be mostly hardscape, with some soft landscape areas that can still be used for various activities. Tree planting creates a visual separation towards the transit centre. Various site furniture, seating opportunities, bike racks and flag poles will be added to the main entry plaza.

The Theatre and Libraray outdoor space will be mostly hard surface, with a planting element reaching into the court yard, providing some smaller break out areas. Seating opportunities for small groups of people will be provided. The Library outdoor spaces will be fenced in.

The Transit Centre area will be mostly hardscape, to accommodate the expected pedestrian traffic. Site furniture like benches, waste receptacles and bike racks will be incorporated. Where sufficient space is

available outside of any pedestrian routes, some landscaping including tree planting is proposed.

A landscape buffer will be provided along the east property line, towards the residential development. Mostly coniferous trees, with some deciduous trees, will be proposed for this area.

Concrete sidewalks will connect parking areas, building entrances and provide hard surface amenity spaces. A standard broom finish and jointing pattern will be used. The concrete finish for the main entry plaza could have some sand blast pattering, providing more interest and highlighting the main entrance to the building.

Sufficient bike racks will be proposed. The product selected will be durable and low maintenance. Bike racks will be surface mounted to the concrete paving.

Ease of landscape maintenance is a major factor for this site. Shrubs and ornamental grasses will be grouped in compact planting beds and are not spread out over the entire site.

PLANT SELECTION

The use of drought tolerant plant material is an important factor for this site, which could include native tree species such as White Spruce or Lodgepole Pine, and adapted tree species that have proven to withstand dry and harsh conditions, like Brandon Elm, Green Ash, Larch, Crabapple varieties, Bur Oak and Japanese Tree Lilac, or shrubs like Spirea, Alpine Currant, Ninebark and Juniper. Ornamental grasses could also be part of the detailed planting concept.

The tree and shrub selection is based on appearance, hardiness, maintenance, leaf colour during the year and sun/shade exposure. Tree planting will be split about 25%-40% coniferous and 60%-75% deciduous trees. All planting beds will have a 100mm depth cover with shredded coniferous wood mulch to prevent weed growth and to keep moisture in the ground. No landscape fabric will be proposed for wood mulch areas.

Sod on 150mm topsoil will be used for most grassed areas. Fescue sod on 150mm topsoil could be used in selected areas towards the storm water management facility along the north property line.

No irrigation system will be required.

CPTED guidelines are a factor in the detailed planting layout. Shrub plantings will be low along walkways and plazas. Deciduous plant material is preferred over coniferous shrubs and trees.

Design North Landscape Architecture Inc., 282 150 Chippewa Road, Sherwood Park, Alberta, T8A 6A2

Appendix H Civil Design Brief

DesignWorks Engineering

Tel. : +1 877 559 6718
Fax : 780 814 5533
Email : info@designworkseng.com

Spruce Grove Civic Center
Schematic Design Report
Spruce Grove, Alberta

Design Works Engineering Ltd.

DW Project Number: 2021287

Date: March 31, 2022

Revision: 0

DesignWorks Engineering

Tel. : +1 877 559 6718
Fax : 780 814 5533
Email : info@designworkseng.com

Table of Contents

DesignWorks Engineering
Tel. : +1 877 559 6718
Fax : 780 814 5533
Email : info@designworkseng.com

1. Introduction

Design Works Engineering and Inspections Ltd. was retained by GEC Architecture to prepare the Civil Engineering design for the proposed Spruce Grove Civic Center in Spruce Grove, Alberta. The report below will detail information on the grading, servicing, and stormwater management designs to be utilized in the proposed development. The proposed development includes the construction of the civic center, as well as transit center and parking, for a total site area of 5.46 Ha. The development is within the Westwind Stage 2 Development, which is currently under design and construction.

2. Water Servicing

Existing Water Infrastructure

Two existing water service stubs have been provided off Westwind Drive, allowing for separated water servicing to the transit center and civic center.

Proposed Water Servicing

The proposed development will include a water service connection for each of the transit center and civic center. Pipes and structures will be designed and specified as per the requirements outlined in the City of Spruce Grove Municipal Development Standards.

3. Sanitary Servicing

Existing Sanitary Infrastructure

Two existing sanitary service stubs have been provided off Westwind Drive, allowing for separated sanitary servicing to the transit center and civic center.

Proposed Sanitary Servicing

The proposed development will include a sanitary service connection for each of the transit center and civic center. Pipes and structures will be designed and specified as per the requirements outlined in the City of Spruce Grove Municipal Development Standards.

4. Stormwater Management Design

Existing Stormwater Infrastructure

The overall storm, sanitary and watermain plan for Westwind Stage 2 provides three separate 675mm diameter stormwater stubs for this site. Through discussion with the City, these services have been sized to accommodate full flows from the site, with no restriction or retention requirements. A stormwater

DesignWorks Engineering
Tel. : +1 877 559 6718
Fax : 780 814 5533
Email : info@designworkseng.com

management pond is to be constructed north of the site, intended to manage the stormwater flow for the surrounding area. The designers have indicated that stormwater from the civic center site may be released directly to this pond, if necessary.

Proposed Stormwater Servicing

While no stormwater retention is required, it will be allowed for in the design. In the event that any on site or downstream pipes are blocked, causing a backup and flooding, spill points will be designed to prevent ponding over 300mm, with the overall site spill directing runoff to the stormwater pond to the north. The spill points will also be designed relative to the building finished floor elevation (FFE) to ensure a minimum freeboard of 300mm above the maximum ponding depth.

Storm runoff will be collected and directed to split the total flow as evenly as possible across the three outlets to ensure surcharging is avoided. Pipes and structures will be designed and specified as per the requirements outlined in the City of Spruce Grove Municipal Development Standards.

5. Site Grading

Existing Surface Conditions

The existing site area is graded to drain south to north, with runoff directed to the stormwater management pond north of the site. The elevation drop from the road tie in at the south to the top of the pond at the north end of site is approximately 1.8m. A privacy/noise barrier is intended to be included along the east site boundary. It is our understanding that the structure will be determined based on the requirements of the civic center site design and will be either a retaining wall or elevated berm.

Proposed Grading Design

The proposed road and parking surfaces will be graded as per the City of Spruce Grove Municipal Development Standards. Longitudinal slopes will range from 1.0% to 4.0%, with cross slopes ranging from 1.0% to 5.0%. While it is noted in the city standard that the slopes may range from 0.75% to 6.0%, the design intent is to avoid the absolute maximum and minimums wherever possible.

Grading within the transit center area will be as per the ETS – Transit Center Design Guidelines.

As stated in the stormwater management design discussion, ponding will be allowed for, to a maximum depth of 300mm.

Due to the existing elevation change from south to north, a retaining wall will likely be included along the north edge of the site. The elevation will be dropped as much as possible from the access roads at the south edge of site to the building, but due to the building door locations, the grades at the rear of

DesignWorks Engineering

Tel. : +1 877 559 6718
Fax : 780 814 5533
Email : info@designworkseng.com

the building are expected to be relatively close to those at the front of the building, which will require a severe grade change when tying to the original ground elevations along the property line.

6. Conclusion

The report has been completed with the intention of providing the design intent for the proposed development. This report should not be used for any other unauthorized uses. If any discrepancies or issues arise, please contact the undersigned.

Heather Boyd, P. Eng.

Civil Design | Civil Engineer

P: 780 244 0252

E: heatherb@designworkseng.com

Design Works Engineering Ltd.

Grande Prairie | Edmonton | Toronto

EDMONTON
#310, 14055 West Block Drive NW
Edmonton, AB T5N 1L8
Canada
T: 780.421.8060

CALGARY
#300, 2207 4th Street SW
Calgary, AB T2S 1X1
Canada
T: 403.283.7796

TORONTO
#403, 179 John Street
Toronto, ON M5T 1X4
Canada
T: 647.749.3388

gec architecture

gecarchitecture.com