University of Saskatchewan
Crop Development Centre

MASTER PLAN & DESIGN GUIDELINES

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1.0 INTRODUCTION

1.1 The CDC Master Plan & Guidelines

The Crop Development Centre (CDC) Master Plan and Guidelines are designed to assist the development of the CDC lands at the University of Saskatchewan ("USask") in the City of Saskatoon. This document is intended to guide the growth and development of the CDC lands in a manner that optimizes the potential of the site along with providing a high quality environment for research and teaching.

Located at the northeast corner of Preston Avenue and 108th Street, surrounded on the north, east and south by research fields, the CDC lands are visually prominent and therefore have a significant role as a gateway and threshold to the USask campus. The Master Plan and Guidelines recognize this role and provide strategies to ensure that future development embodies the high quality characteristics of the campus.

The Master Plan provides a recommended strategy for the location of new buildings and additions to existing facilities presented in two phases. Phase 1 reflects facilities that are currently planned and can be implemented in the near term. Phase 2 provides a strategy for the development of future facilities which may be required in the long term. Design guidelines for Site Planning, Architecture and Landscaping are included in these guidelines and complement the CDC Campus Master Plan drawings.

The purpose of the guidelines is to set out a consistent standard of architecture and landscape design to ensure the quality of development complements the high quality of the USask campus. The guidelines emphasize and encourage environmental sustainability and design excellence while recognizing the agricultural and utilitarian nature of many of these facilities. While the CDC Master Plan emphasizes the importance of functionality and flexibility as key principles, it also places a new emphasis on indoor and outdoor environments that provide a higher quality of life for those who work on the campus. Access to landscaped and shaded outdoor seating areas and enhanced use of natural light within buildings are two examples of design concepts that can improve the daily experience for CDC's users.

Significant enhancements that meet both aesthetic and environmental objectives can be achieved through a program of landscape enhancements throughout the campus and along its perimeter including tree planting, other plantings, rain gardens and landscaped swales.

These guidelines can be used in planning for future development and are intended to be flexible. They are to be followed in conjunction with other policies, codes and regulations of the City of Saskatoon, University of Saskatchewan, and other regional and provincial regulators.

Figure 1. The University of Saskatchewan campus seen in aerial view looking east. The CDC lands are located at the east 'gateway' between the research fields and the main campus.

2.0 CDC MASTER PLAN

2.1 CDC Today - Existing Condition

The CDC site is an 7.59 hectare (18.75 acres) site owned by the University of Saskatchewan, located east of the main campus area. It serves as hub for crop and soils research and a base for the teaching and research conducted in the surrounding fields.

The entrance of the site is located on 108th Street. There are currently seven one-storey buildings/structures scattered on the north portion of the site. Two main surface parking lots are located at the centre of the site and on the former 108th Street right-of-way. Agricultural vehicles and equipment are stored on the site on lands presently undeveloped.

The spaces between buildings are largely undefined. As the CDC site evolves, the informal, utilitarian nature of the present site can be designed to better define spaces for parking and vehicular use so that clear and safe areas for pedestrians and outdoor landscaped areas can be created.

Tree canopy coverage on the site is sparse with only a cluster of trees along the western boundary. A program of landscape improvements including clusters of tree planting, and the extension of the shelter belt on Preston Avenue can significantly enhance the environmental and aesthetic qualities of the CDC for a relatively modest investment. Areas required for outdoor storage of equipment and vehicles can be screened using this landscape strategy.

As CDC's operations continue to grow a two-fold challenge is emerging. On one hand there is an increasing demand for building expansion, and with-it spaces for parking and equipment storage. On the other hand, there is a desire to minimize any incursion into the surrounding research fields. As a result, there is a new imperative to work efficiently within the existing 7.59 ha. site area. This framework of land-use efficiency translates into the need to remove some buildings at the end of their lifespan to free up spaces for new development as well as designing for a more compact layout including the potential in the long-term for multi-story buildings.

The following map summarizes the current uses and the areas of the existing structures.

INDEX	BUILDING NAME	EXISTING	
		Storeys	GFA(sm)
1	MOST Building	1	330
2	Equipment Storage	1	645
3	Crop Science Field Laboratory	1	4960
4	CFSL Seed Storage Building	1	1160
5	Green Houses	1	920
6	CFSL Quonset	1	370
7	Container Storage	1	530
Total			8915

Figure 2. CDC Lands Existing Condition

In the following the Master Plan considers the near-term and long-term development of the site. The layout of the Master Plan considers the locations of existing underground utilities to ensure the placement of the new facilities causes minimal interference with these utilities.

2.2 Near-Term Phase

Near-term development is expected to occur over a five-to-ten-year period. The new buildings and additions identified in the following have been identified by USask as potential near-term projects which are subject to funding. There is the potential for some of these projects to not be realized in the near term in which case they would carry into the long-term development scenario.

The following is a summary of the developments expected to occur in the near-term.

- Removal of the following structures: CFL Quonset, Greenhouses
- Construction of new buildings and additions to existing buildings: Science Field Lab Addition, Seed Storage Building Addition, new Soil Science Building, MOST Building addition.
- Expansion of the CDC site boundary northward by approximately 35 metres to facilitate a new entrance/exit onto Preston Avenue aligned with the Preston Avenue/Perimeter Road intersection. This expansion increases the total site area by 0.66 hectares to a total of 8.25 hectares.
- Shelter belt tree planting/infill along Preston Avenue; on the north and west boundaries of the CDC site and the future Fire Hall site; on the west boundary of the CDC site and sub-station.
- Relocation of shipping container storage to to a screened location on the west boundary adjacent to the future Fire Hall site.
- Enhancement of open spaces associated with existing and new buildings with pedestrian pathways, outdoor seating areas, tree planting and rain gardens.
- Reconfiguration of the parking lot south of the Science Field Lab with the integration of a landscaped swale incorporating grasses and tree planting to capture run-off.

INDEX	BUILDING NAME	NEAR-TERM	
		Storeys	GFA(sm)
1	MOST Building	1	330
1.1	MOST Building Addition	1	330
2	Equipment Storage	Removed	0
3	Crop Science Field Laboratory	1	4960
3.1	Crop Science Field Laboratory Addition	1	2530
4	Seed Storage Building	1	1160
4.1	Seed Storage Building Addition	1	1230
5	Green Houses	Removed	0
6	CFSL Quonset	Removed	0
7	Container Storage	Removed	0
8	New Equipment Storage	1	1640
9	Soil Science Building	1	1055
10	New Outdoor Storage	1	580
Total			13815

Figure 3. CDC Lands Near-Term Phase (Phase 2)

2.3 Long-Term Phase

The long-term phase illustrates the future potential for a full-build out of the CDC site resulting in a GFA of 42,375 sq. metres (460,000 s.f.) which is a 475% increase over the current GFA of 8915 sq. metres. (95,960 s.f.). Although this extent of growth may not be required, it provides a reasonable benchmark for the ultimate capacity of the CDC lands which equates to a site FSI of .51.

The long term expansion consists of two parcels which could accomodate buildings of up to 3-storeys . The north parcel is a 1.0 ha (2.5 acre) site, located adjacent to the new entrance on Preston Ave. N. The south parcel is a 0.9 ha (2.2 acre) site fronting onto 108th Street. Given its adjacency to the intersection of Preston Ave N and 108th Street, it presents an opportunity for a landmark building.

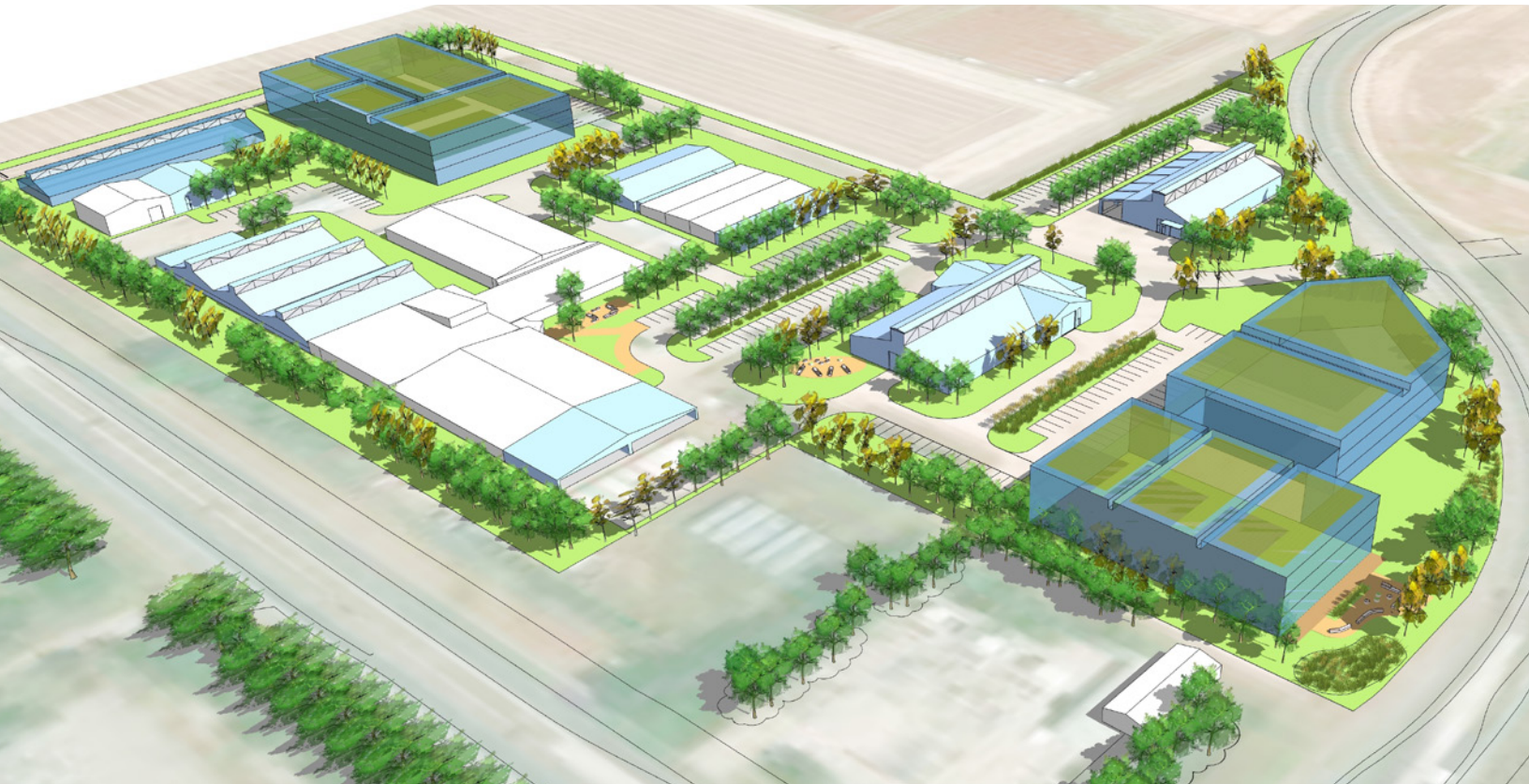
In this phase outdoor storage and shipping container storage is assumed to be replaced with indoor storage or limited screened outdoor storage areas.

2.4 Implementation

The CDC Master Plan is intended to be a living document, structured to provide the university with a flexible decision-making framework to accommodate specific opportunities and needs as they emerge over time.

It is anticipated that some aspects of the plan will continue to evolve and change over time therefore the implementation of the plan should remain flexible, focusing on achieving the intent of the design guidelines contained in the following sections.

Figure 4. CDC Lands Long-Term Phase Perspective



INDEX	BUILDING NAME	LONG- TERM	
		Storeys	GFA(sm)
1	MOST Building	1	330
1.1	MOST Building Addition	1	330
2	Equipment Storage	Removed	0
3	Crop Science Field Laboratory	1	4960
3.1	Crop Science Field Laboratory Addition	1	2530
4	Seed Storage Building	1	1160
4.1	Seed Storage Building Addition	1	1230
5	Green Houses	Removed	0
6	CFSL Quonset	Removed	0
7	Container Storage	Removed	0
8	New Equipment Storage	1	1640
9	Soil Science Building	1	1055
10	New Outdoor Storage	Removed	0
11	Future Building	3	15000
12	Future Building	3	13200
13	Future Building	1	1300
Total			42735

Figure 5. CDC Lands Long-Term Phase (Phase 3)

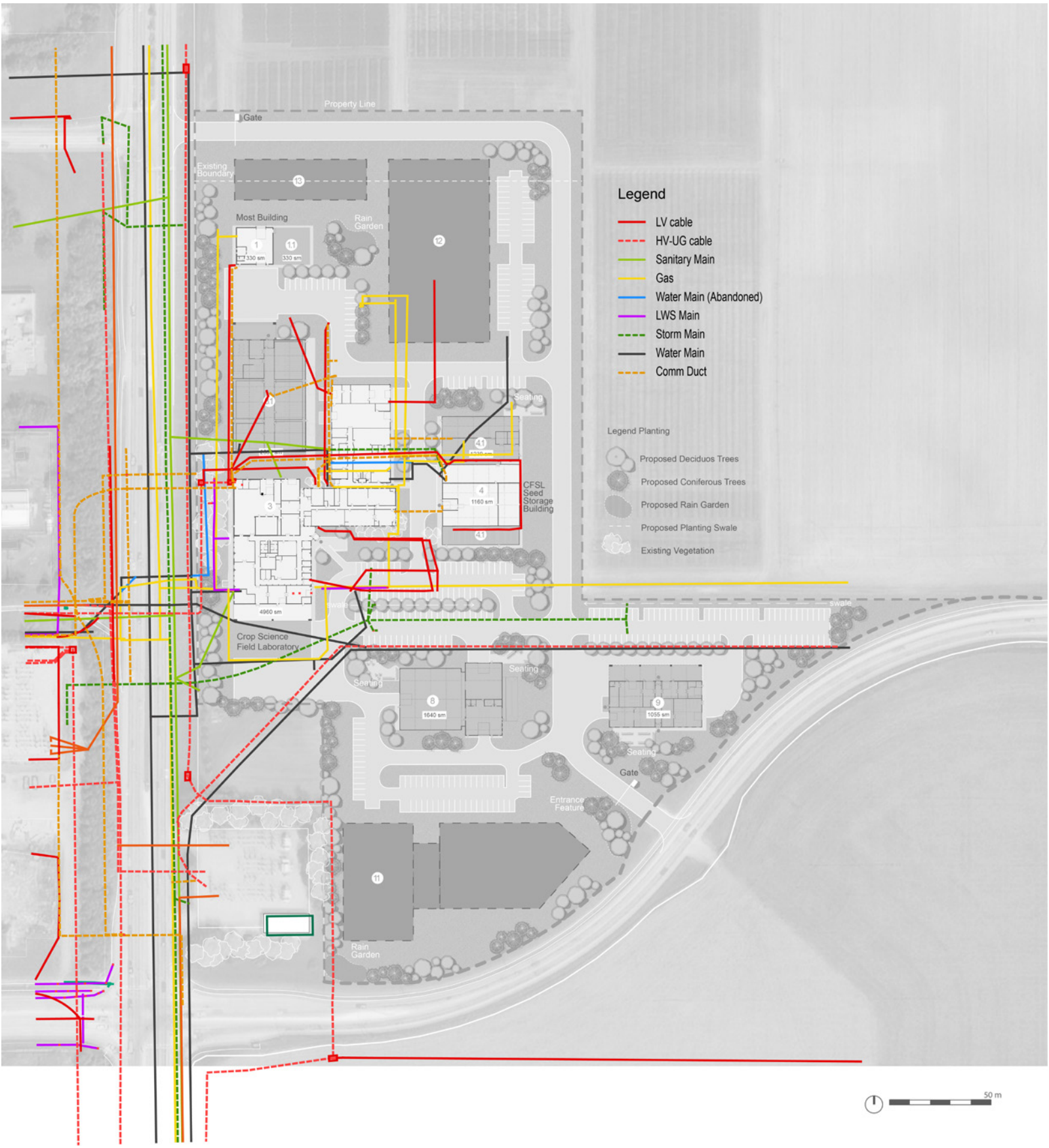


Figure 6. CDC Lands Long-Term Phase with Existing Servicing Locations

3.0 SITE DESIGN GUIDELINES

3.1 Site Access

The site is currently accessed via 108 Street, entering from south east of the site, north of 108 Street. In Phase 1, two entry points of the site are provided, with an additional entry point located north west of the site at Preston Avenue. The access into the site will be controlled by two gates, located at these two entry points from Preston Avenue and 108 Street. A 9.0-metre-wide service road will connect these two gates and serves as the main thoroughfare for vehicles, pedestrians, and cyclists.

3.2 Circulation and Service Areas

The access points to parking lots, loading areas and buildings will be consolidated through 7.0-metre-wide shared driveways to facilitate vehicle movement which connect to the internal service road.

Two large parking lots are located on the east side and west side of the service road. The western parking lot is in the middle of the site, surrounded by existing and new buildings. The east parking lot is in the area of the former 108th street ROW.

Permeable pavers, granular, concrete or asphalt pedestrian paths will be designed to connect building entrances and outdoor amenity areas and will incorporate tree planting for shade and aesthetic enhancement of the campus.

Figure 7. USask CDC Lands Aerial

3.3 Stormwater Management

The approach to storm water management should be augmented by a Low-Impact Development (LID) strategy that will take the approach of landscape-based stormwater management, using on-site "green" measures such as: permeable pavement where possible; grassed swales around parking areas; roof runoff directed to rain gardens and landscaped areas; green roofs; and other measures. These strategies are aimed to achieve storage and infiltration controls of the stormwater to reduce the burden of the storm drainage system and manage overall peak flows, while also supporting biodiversity.

Considerations:

- Grading to allow greater ponding of stormwater and natural infiltration.
- Directing roof leaders to rain gardens, landscaped ponding areas, soak away pits, or to cisterns or rain barrels.
- Incorporating grassed swales where feasible.
- Opportunities for water re-use, such as rainwater harvesting.
- Where feasible, incorporating green roof systems into the proposed building to help minimize runoff generated by the buildings.
- Paved areas such as streets, driveways and surface parking should be reduced to minimize the volume of runoff flowing into the storm drainage system and to maximize landscaped surfaces.
- Permeable paving where feasible may be considered for parking areas, hardscaped forecourts/courtyards and for walkways.
- Impervious areas and snow storage areas should be graded to drain towards landscaped swales.
- Bioretention areas should be incorporated into the edges of walkways, parking lots and other paved areas to minimize the dependency on the stormwater drainage system. They should also be located to capture runoff from building roofs.
- Bioretention areas should contain native grasses and other plants that can thrive in a wet environment.

Figure 8. Permable pavement

Figure 9. Rooftop garden

3.4 Landscaping and Forestation

An expanded investment and program of landscape enhancements offers a means to improve the aesthetic qualities of the CDC campus recognizing its high visibility and gateway location to the main campus at USask. Similarly, tree-shaded outdoor seating areas can provide a higher quality environment for staff.

Considerations

- Preston Avenue: a consistent buffer of tree planting should be provided flanking the west property line along Preston Avenue using clusters of Quaking Aspen (Populus tremuloides), Ponderosa Pine (Pinus ponderosa) and White Spruce (Picea glauca).
- 108th Street: a rhythm of tree clusters and openings permitting views to the CDC campus should be created flanking the south property line along 108th street. Recommended tree cluster species include: Birch and Pine, Birch and Spruce, Aspen and Pine, Aspen and Spruce, large planting areas should surround each cluster planted with Canadian Serviceberry (Amelanchier canadensis), Snowberry (Symphoricarpos albus), Vibernum and Creeping Juniper (Juniperus horizontalis).
- Rain Gardens and Swales: areas in proximity to new and existing buildings should be reserved for storm water swales and rain gardens connected to building roof drains and planted with grasses (Kark Foerster and Big Bluestem).
- Outdoor seating areas with benches and picnic tables should be provided in association with new and existing buildings situated adjacent to tree clusters that provide shade. Granular stone graded to drain into adjacent landscaped areas should be used as surface materials.

Figure 10. Parking lot vegetation

Figure 11. Landscaped swales in parking lots

Figure 12. Rain garden

- The design of parking lots should include grading to direct runoff to linear swales
- Other tree species internal to the campus should include Freeman Maple (Acer x freemanii), Birch (Betula), Oak (Quercus) and Elm (Almus).

3.5 Storage

Considerations

- Equipment or materials supplies stored outdoors should be screened from view using fencing in association with planting.

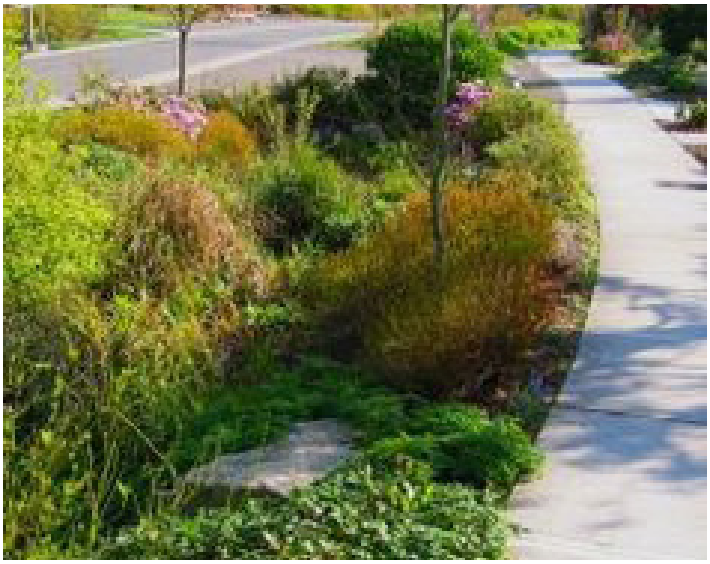


Figure 13. Landscaped swales

Figure 14. Historic vegetation around Usask campus

3.6 Species Selection Criteria

When selecting plant species, plants that are native to Saskatchewan are preferred for their ability to support ecosystems, provide food for humans and animals, and their ability to survive in Saskatchewan's harsh winter conditions. These plants are grouped together in ways that reflect and pay homage to the Aspen Parkland ecosystem. Some plants such as the Pondersosa Pine, and the Autumn Blaze Maple, though they are not native, were chosen for their desirable aesthetic characteristics. Both Bur Oaks and American Elms will provide wonderful canopies that will shade the outdoor seating areas throughout the Crop Development Centre.

Therese Bugnet Rose

Burning Bush

Glow Girl Spirea

Ninebarks

Shrubs

Calgary Carpet Juniper

Snowberry

Highbush Cranberry

Saskatoons

Figure 15. Shrub species

Grasses

Blue Oat Grass

Karl Forester Grass

Ribbon Grass

Blue Wheat Grass

Figure 16. Shrub species con'd and grass species

Trees


Bur Oak


American Elm


Silver Maple


Amur Maple


Autumn Blaze Maple


Paper Birch


Birch


Trembling Aspen


White Spruce


Ponderosa Pine


Ornamental Crabapple

Figure 17. Tree species

4.0 ARCHITECTURE DESIGN GUIDELINES

The following guidelines provide recommendations on the design of new buildings and additions including: orientation/location, setbacks and separation distance, massing, elevation, materials, and green building design. These guidelines are intended to to ensure the following objectives are achieved in future developments:

Objectives

- To achieve a high standard of building design that is appropriate to its function.
- To create spaces that encourage interaction, collaboration, and innovation.
- To encourage building design that provides positive interface to the street.
- To encourage building design that contributes to the identity of the University of Saskatchewan and reflects the innovative scientific research function of the site.
- To enhance existing buildings and improve their visual appearance appropriate to their function.
- To encourage green building design that contributes to the operational and environmental sustainability of the site and campus.

Figure 18. Agriculture building precedent (above and below)

4.1 Site Context

The CDC lands are situated east of Preston Avenue, and north of 108th Street – at the junction of two main thoroughfares that serve as an important gateway to the main USask campus.

Future improvements and new additions to the CDC lands should recognize its strategic role as a gateway to USask and in this respect should complement the qualities of the main campus.

The design of new buildings and additions on the CDC lands should be based on a rational consideration for role and function while preserving land for future development to occur within the CDC boundaries. Compact and efficient use of the remaining site areas is important to permit room for future growth.

Generally, the buildings at CDC today are agricultural and utility type structures. As the Centre grows, increasing attention to the architectural quality of buildings should be considered, particularly buildings of high visibility. There are some simple measures that can enhance both the appearance of these buildings and the quality of the environment they provide for their users.

Considerations:

- The design for new buildings should strive to occupy as minimal a footprint as possible in order to preserve land for future expansion.
- Where appropriate and feasible, multi-storey buildings should be considered.
- New additions to buildings should be of an appropriate scale to its respective building.

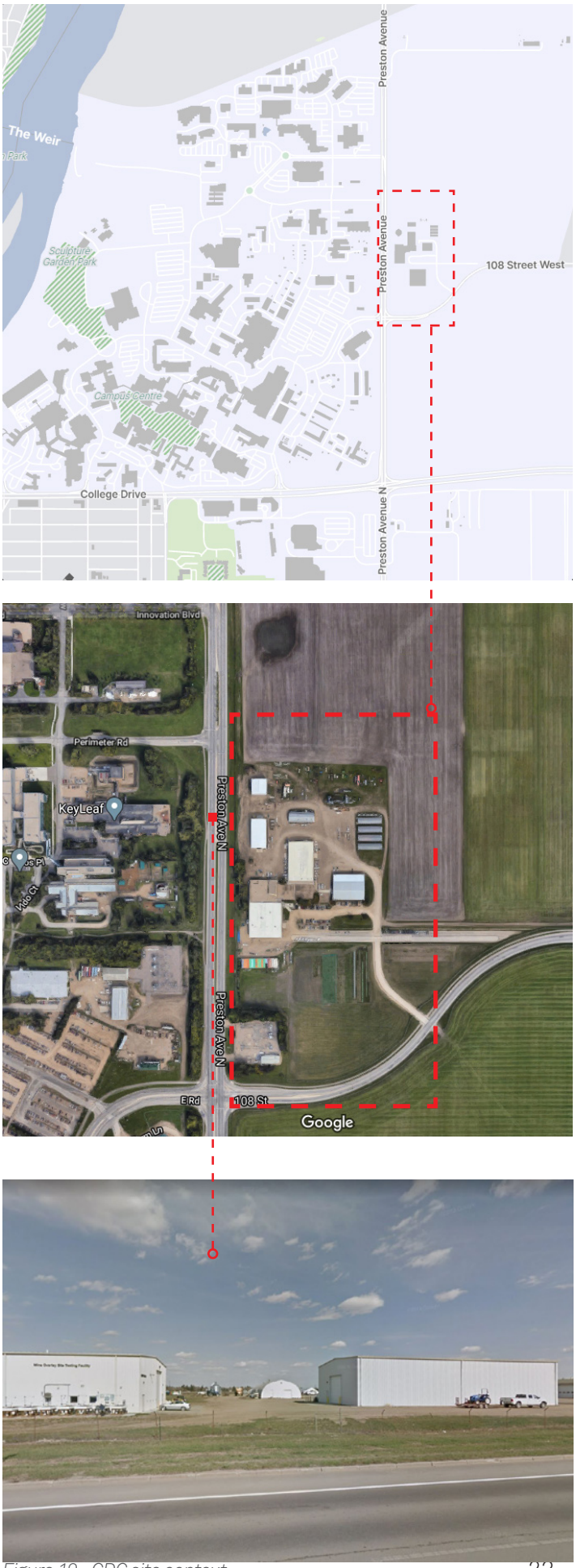


Figure 19. CDC site context

4.2 Building Orientation/Location

Considerations

- Where buildings are directly visible form Preston Avenue and 108th Street the placement of the building and its design should create a positive relationship with the street.
- Portions of the building should integrate windows as well as clerestory glazing where natural daylighting is appropriate for the internal building uses.
- The placement of the building should minimize the exposure of service areas, loading and equipment storage from street view.
- Where it is necessary to store equipment outdoors, fencing and landscape screening should be used to shield views from the street.

4.3 Setbacks

Considerations

- Provide a minimum 8.0 metre setback from Preston Ave, 108 Street and the service road to provide space for a landscaped buffer.
- Provide a minimum 4.0 metre setback for landscape buffer from the property line of the Fire Hall site.

Figure 20. Natural light and wood as a building material reflect green building principles

Figure 21. Agricultural building precedent

4.4 Massing and Height

Considerations

- Individual building heights should be determined on site context, adjacent buildings, and its function requirements.
- Where the building program permits, multi-storey development should be considered as it can achieve the same total floor area as a single storey building with the benefit of reducing the building footprint and water runoff on the site.

4.5 Elevations

Considerations

- The architectural character of new buildings should be contemporary in nature
- The building's design should find a balance between design excellence and economic considerations (i.e. cost-saving measures).
- The architectural style of new additions to existing buildings should consider it as an opportunity to enhance the appearance of the existing building.
- Builidng uses may include uses such as offices, labs, common areas and industrial/storage areas. Both portions should be unified by the architectural treatment. Where possible, lobbies, offices and common areas should be designed as an architectural focal point with larger glazing to provide views and daylight.

Figure 22. Building massing precedents

4.6 Main Entrances

Considerations

- Main entrances should be architecturally pronounced to establish the identity of the building using canopies and roof overhangs.
- Main entrances are encouraged to be oriented directly toward pedestrian walkways, designated vehicular drop-off areas or convenience parking.
- Main entrances should be designed to meet all accessibility needs either by designing the entrance to be generally at the same grade as the adjacent sidewalk or by integrating other design solutions such as ramps into the architectural design of the building.
- Main entrances should be covered with an entrance canopy or similar treatment that provides sufficient weather protection.
- Bike parking facilities should be in a convenient location close to the main entrance.
- Uniform signage consistent with USask main campus signage and exterior lighting should be provided at the main entrance to help orientation for visitors and improve safety.

Figure 23. Glazed canopy entrance

Figure 24. Wood soffit canopy over entrance

Figure 25. Building entrance

Figure 26. Straw bale facade

Figure 27. Metal facade

Figure 28. Rammed earth

4.7 Architectural Detailing

Architectural details can enhance the character of key facades and should consider windows, glazed canopies, clerestory glazing, exposed structural elements, architectural sunscreens, horizontal and vertical jointing.

4.8 Materials and Colours

Considerations

- Generally, the use of high quality metal siding for utility type agricultural buildings is appropriate.
- Sustainable, alternative building materials should be considered including straw bale and rammed earth.
- Coloured siding other than those listed below should be avoided in order to feature the colours inherent in the surrounding landscaping and trees.
- The following metal siding colours should be used: Natural metal colour (aluminium, galvanized metal); dark grey, white.

Figure 29. Metal siding, saw tooth roof with PV panels

Figure 32. Agricultural building with clerestory

Figure 30. Metal facade

Figure 31. Wood facade

4.9 Green Building

Considerations

- Leadership in Energy and Environmental Design (LEED) should be used as a reference for the performance standards in the design, construction, and operation of the new buildings.
- Sustainability should be designed into buildings from the earliest stages and should be considered from a life-cycle perspective.
- Explore opportunities for collaborative demonstration or pilot projects focusing on sustainability.
- Consider using renewable energy, such as geothermal energy to heat and cool buildings, which will reduce GHG emissions and reduce operating costs.
- Use passive heating and cooling techniques to reduce heating and cooling loads. For example, convection cooling using both ground floor operable windows and a roof monitor with clerestory operable windows for passive ventilation; shading strategies on south-facing windows/glazing in the summer months; and thermal mass techniques to absorb heat during the day and disperse during the night.
- Provision of sustainable waste management system by providing separated cabinet space in building for segregated collection of four waste streams: Recyclables, Organics, Waste and Industrial Hazardous Waste
- Require a Green Building Design Checklist for each new building to ensuring that new buildings meet the minimum green building design standard.

Figure 33. Rooftop design: light coloured aggregate, PV panels and sedum green roof materials

Figure 34. Straw bale construction

Figure 35. Integrated planting as an architectural expression of sustainable design