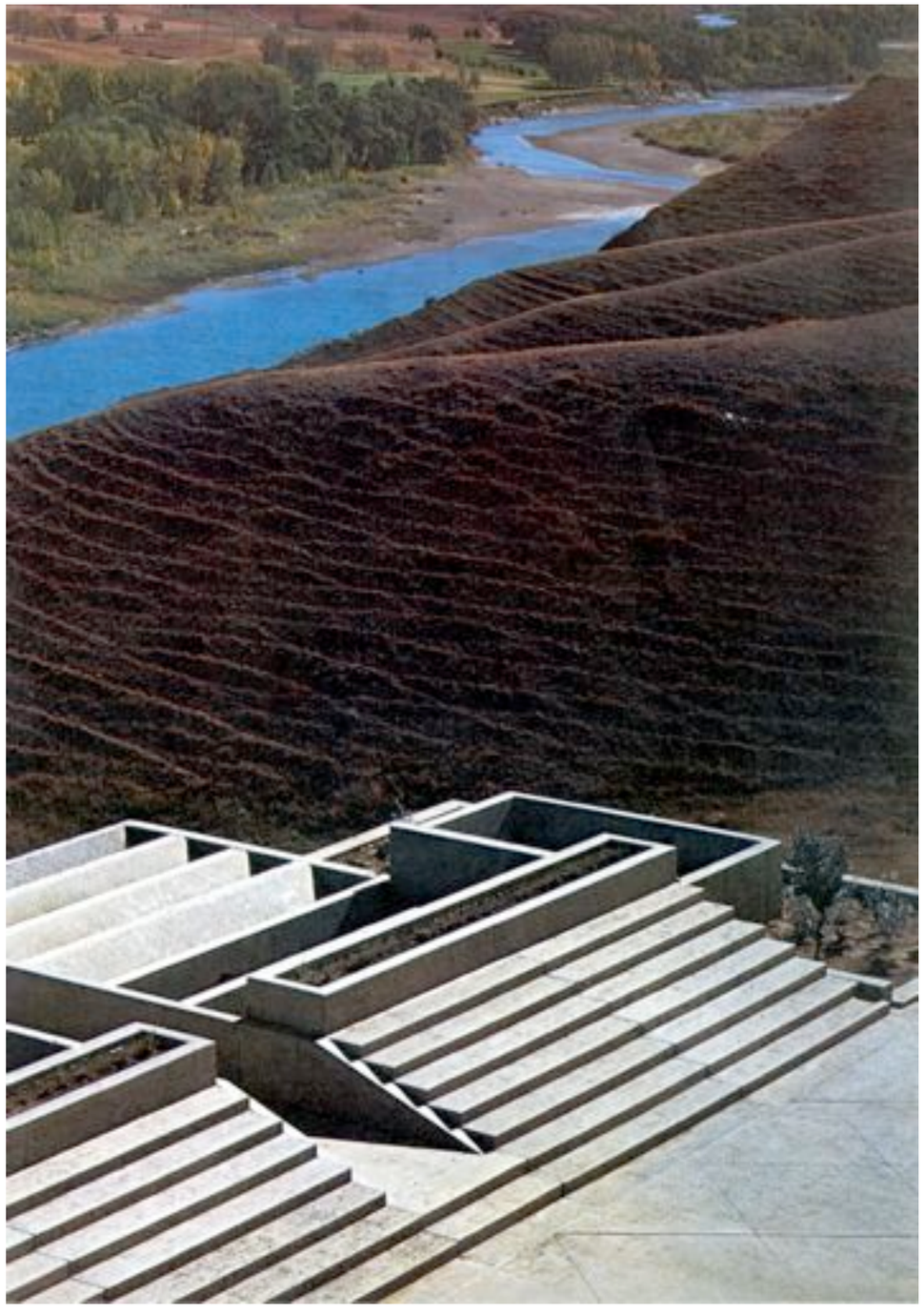

Acknowledgments

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1.0 INTRODUCTION

The following report presents the findings of the University of Lethbridge Core Campus Expansion Plan. The plan was initiated in May 2001 with the objective to establish the physical planning framework for growth of the core areas of the University of Lethbridge campus. The process of undertaking the plan has been led by a Steering Committee comprised of faculty, students and administrative staff.

The plan presents information in the areas of campus expansion, master plan design, population growth, space needs projections, parking, building and site design and engineering issues. A 3-D computer model has been generated to illustrate the recommended design of the campus expansion.

The plan has evolved as a result of a highly participatory process involving two public open houses, workshops with the Steering Committee and the Board of Governors, consultation with the Deans of the Faculties and School, as well as other community stake holders including the City of Lethbridge. Additional dissemination of the plan's work-in-progress was provided through the project web site. The Core Campus Expansion Plan web site (*http://home.uleth.ca/exp/*) received 11,000 visits from July to October 2001 and facilitated substantive feedback through email links sent directly to the planning team.

Although the parameters for the study focus on a plan for expansion of the core academic campus area, the recommended plan and design principles regarding this area have an impact on the configuration of other areas including Exploration Place, the Aperture Park residential village, and the South Campus area. Consequently the report depicts recommended configurations for these areas beyond the Core Campus.

The plan has also been guided by the University's strategic goals and mission and is based on an evaluation of a series of issues including space needs, phasing, funding, building and landscape design, traffic and parking, utilities, facilities operations and maintenance. The need for the plan is a reflection of continued growth and the on-going pressures for additional space within the core campus to facilitate teaching, research and the functions that support the University's programs and its role as a key provider of services to the Lethbridge community.

In formulating a planning strategy no ultimate population size was assumed by the study. Rather a series of campus planning and design principles were developed and tested to determine the ultimate yield that the campus lands could reasonably and affordable support. This exercise results in an approximate campus population of 11,300 (9,380 students/1,620 staff) representing an increase of 54% over the current campus population of 7,155. This figure should not be construed as a recommended target for the University's size. It is beyond the role of this study to comment on a desirable campus population size. This is an issue currently under discussion within the campus community and will be determined in accordance with the strategic objectives of the University of Lethbridge.

Figure 1.1: Panoramic View of University Hall

Figure 1.2: Aerial view of the campus

Figure 1.3: Model view of proposed campus expansion

2.0 KEY FINDINGS & RECOMMENDATIONS

The key findings of the Expansion Plan are as follows:

- The Core Campus area can comfortably grow by an additional 67,000 gross square metres of academic, support and research space within the 10-minute walking distance. As a point of comparison the combined gross building areas of University Hall and the Centre for the Arts is approximately 68,000 gsm.

- An additional 43,700 gross square metres of research space can be provided, within the Exploration Place research park, but generally beyond the 10 minute walking distance.

- Based on these building expansion areas and utilizing present space utilization rates the campus can comfortably accommodate a campus population of approximately 11,300.

- If growth is anticipated beyond this population level it is likely that a number of development conditions will be required which were considered to be less desirable and/or more expensive. These include buildings taller than 4 floors, extensive use of parking garages and further development of sites within the coulee areas west of University Hall.

- If the annual campus population grows at a rate ranging from 2% to 3%, a reasonable pace of construction could be implemented resulting in a full build out from 23 to 16 years (i.e. if annual growth occurs at a rate of 2% build-out will occur in 23 years; growth at 3% would result in a 16 year build-out period. Note that enrollment grew 3.7% from Fall 2000 to Fall 2001).

- Growth rates in the 4% to 5% range will generally require a new building to come on stream every year and a full build-out of the campus would be achieved in a 12 to 10 year period.

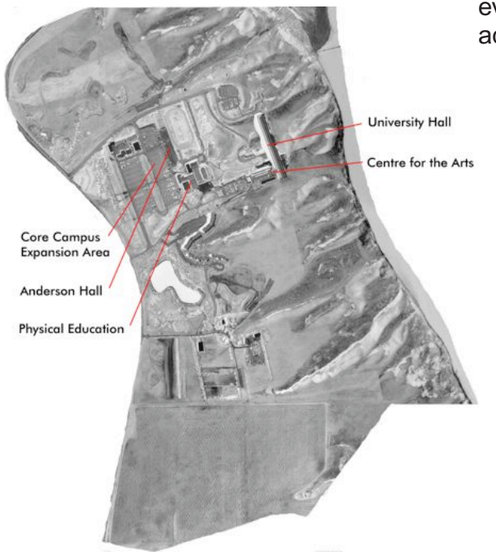


Figure 2.1: Aerial view of the existing campus

- Growth rates in the 6% to 8% range would result in an extremely condensed construction program, which is likely to see multiple buildings constructed annually and full build-out achieved within 8 to 6 years.

- Expansion of academic buildings in the Core Campus area should be accessible within a 10 minute walking distance between classes, It should be focused on the plateau area in the vicinity of Anderson Hall and include lands currently occupied by the 400-metre track, soccer field and tennis courts.

- A new energy plant is required in the near future to accommodate growth of the University's academic facilities. Energy Plant #2 should be located near Valley Road in the vicinity of Anderson Hall to take advantage of prevailing winds.

- Buildings are generally recommended to be 3 to 4 floors in height with most academic buildings ranging in size from 8,000 to 10,000 square metres. Buildings of this height and size allow for a steady pace of growth in keeping with anticipated funding increments. Lower building heights would consume valuable land within the 10 minute walking area and result in the displacement of parking. Buildings in the four storey range are compatible with existing buildings on the plateau whereas buildings higher than four levels could detract from the overall campus image of strong horizontal planes as viewed from across the river. Buildings of this scale incorporating appropriate setbacks and weather protective elements such as colonnades and canopies also contribute to a sense of human scale and promote the more active use of sheltered courtyard type outdoor spaces.

- Development beyond the Safe Building Line as defined by the City of Lethbridge should generally be avoided.

- The tennis courts and soccer field presently located east of Anderson Hall should be relocated to the green space between University Drive and the West parking area. Existing vegetation in this area should be preserved to as great an extent as possible and additional planting provided for wind shelter of the field and courts.

- The University Centre (also referred to as the Regional Cultural/ Wellness Centre and includes an athletic Field House possibly combined with Art Gallery) should be sited west of the existing Physical Education building providing direct interior links. This location provides direct parking access that is critical to the function of University Centre as a community resource. A dedicated parking area with approximately 100 stalls for community use should be provided.

- Two preferred locations are identified for the Art Gallery component. The first is the promontory site presently occupied by the tennis courts, which could be developed in association with a University Club and shared dining facilities. The second location is adjacent to the Field House in the West parking lot.

- The future expansion of academic areas in the Sciences should be located in the Valley Road area and north of the proposed Quad. This location is both within the 10 minute walking distance and close to the science research facilities at Exploration Place. Science research and teaching labs should be located in buildings flanking Valley Drive (see buildings C, D and E) to take advantage of prevailing winds. A shared green space (labelled Research Green in the plan) provides an amenity space between the academic campus and Exploration Place and establishes a strong campus identity as part of the entry sequence on Valley Road.

- Large sports fields including the 400-metre track should be located in the south area of the campus.

- A significant green space should be preserved east of Anderson Hall and redefined as a new University Quad providing a central organizing feature of the campus expansion area.

Figure 2.2: Expansion Plan Concept

- Additional expansion of the campus, including the Core Campus, Exploration Place and the Aperture Park Residential Village should encourage a pattern of buildings grouped around human-scaled, courtyard-type open spaces, to promote greater use of sheltered outdoor areas on campus.

- Buildings, trees and other structures including colonnades should be strategically placed to provide wind sheltering for pedestrians and favorable microclimate conditions.

- The determination of parking requirements was based on utilization rates of 0.3 stalls per person, which is consistent with similar campus contexts in Canada. It should be noted that reductions in parking demand will translate to less land area consumed for parking. In turn, this may provide a greater land area for additional academic building area close to the core campus while increasing the University's ability to support a larger campus population. As a means of easing the current demand for parking the University should proactively promote higher utilization of transit and more on-campus housing.

- Expansion of surface parking areas and replacement parking for areas displaced by new buildings should be located primarily north of Valley Road. Disruption of existing landscaped areas south of Valley Road should be minimized.

- Structured parking below new buildings should be considered in locations closest to the Centre for the Arts and University Hall (buildings B & C).

- If present parking demand rates continue a parking structure located close to the Valley Road/ University Drive entrance should be considered as the campus reaches its ultimate size. The ground floor of the structure should provide active uses such as office or retail facing Valley Road

- The experience of entering the campus should be improved to convey a positive image of the University. The realignment and redesign of Valley Road - the most heavily used access point to both the University and Exploration Place – should emphasize views of feature campus areas, entrances and landscapes.

- A continuous north-south road link should be provided to facilitate internal campus service and security mobility and to promote quick distribution of traffic to parking areas.

- The dominant presence of surface parking that presently exists should be mitigated through new road alignments, building placement, and tree planting and landscaping within parking lots and aisle ends.

- Open space promontories at the valley edge which provide sweeping views of the Oldman River should be preserved as "sacred sites" available for public access and, in special circumstances, buildings of a highly public nature. Pedestrian and vehicular circulation routes and the placement of buildings should reinforce view corridors to these sites.

Figure 2.3: Detail of Exploration Place concept

- A program of art installations, landscape features and earth works exploring themes of regional culture, available for public viewing, should be provided at each of these promontory sites.

- Existing trees and vegetation should be preserved and enhanced wherever possible. Approximate locations of vegetation have been mapped as part of this study. Accurate mapping and inventory of vegetation should be undertaken as a priority task prior to the detailed design of new projects.

- Storm water drainage from parking areas and rooftops should be channeled to a series of new storm water quantity/ quality ponds to improve water quality and reduce valley erosion. These ponds should be designed as feature amenity areas.

- New buildings on campus should be environmentally responsible and should be designed in accordance with the National Energy Code for Buildings. The budgeting process for new projects should recognize lifecycle costs of building structures and factor minimized future operating costs in the review of initial capital costs.

- New buildings should contribute to the tradition of architectural innovation and excellence which the University is known for. Building design should utilize an architectural vocabulary that complements existing buildings utilizing materials such as light coloured precast concrete, natural and manufactured stone .

3.0 CAMPUS VISION

While a campus plan must be many things - functional, cost-efficient, and technically sound, it must never lose sight of the fact that its objective is to provide a setting that both symbolizes and inspires human excellence. The quality of the University environment is indicative of the values and aspirations of the community. With its foundations firmly established in Arthur Erickson's 1969 plan, the University of Lethbridge has developed one of the most striking and recognized university campuses in Canada. Erickson's inspired vision has served the University well – the powerful image of University Hall has become a central symbol of the institution and 30 years later the building remains inseparable from a definition of the University. In the Maclean's 2001 Guide to Canadian Universities and Colleges, an evaluation of the University begins with a reference to its setting:

"Renowned architect Arthur Erickson designed the University of Lethbridge's central building, University Hall, anchoring the campus within the folds of the scenic Oldman River Valley in southern Alberta. It seems an appropriately cozy niche for a university with a keen sense of its place in the world."

The strong elemental form of Arthur Erickson's University Hall, which spans the undulating coulee valley, echoes the form of Lethbridge's famous Trestle Bridge. Erickson's original master plan from 1969 recommended further expansion of the campus with similar bridge-like forms further to the south (Figure 3.1). These large spanning structures were linked to the upper plateau where a number of conical shaped buildings would be placed.

Figure 3.1: Model of Erickson's 1969 plan

Erickson's vision for the campus was a poetic response to the magnificent landscape of southern Alberta. An extract from the 1969 plan reads:

"Reduced to elementals – the sky as space, the earth as form, every aspect of these becomes poignantly clear. The pattern of clouds, of plowed fields or river coulees, each vividly conveys a meaning. Colour is the sky under storm, wheat stubble in the snow, a newly turned earth. Each set of colours unveils meaning. Thus, to maintain harmony with the land, one must submit to its rules. One must use space generously or not at all. Buildings must grow out of the ground, clustered with other buildings or trees, but never sit blatantly on top of the ground. Forms must be simple and geometrically concise, as elaborate forms and fussy detail show as weakness. As the geometry of the section measures out the landscape, one must work with an equally clear geometry or appear indecisive. Just as the prairie landscape has been reduced to essentials, so must its buildings be elemental."
(Erickson/Massey - Development Plan, University of Lethbridge - March 7, 1969)

Operating in a competitive environment, university's are increasingly recognizing the importance of the quality of their campus setting in attracting students, faculty and funding. The significance of the campus also extends well beyond its borders. The University of Lethbridge is central to the identity of the City of Lethbridge and its evolution.

The Core Campus Expansion Plan establishes a design vision for the expansion areas of the campus that reflects the high standards of quality evident in University Hall, the Centre for the Arts, and the recently constructed LINC building. Yet the vision for the campus also addresses recognized shortcomings of the existing campus and in particular, places new emphasis on the quality and scale of the outdoor spaces on campus with the intent of creating safe and comfortable courtyards, pedestrian pathways and recreation areas. Key principles of the plan include:

- The creation of appropriate human-scaled building form and massing which supports favourable micro-climates that encourage greater use of outdoor areas and pedestrian systems.
- A network of human-scaled courtyards.
- A flexible building framework that can easily be adapted to a variety of uses as evolving demands dictate.
- An architectural treatment that allows for incremental expansion yet results in a cohesive and attractive design that complements the high quality setting of the campus.
- An appropriate gateway design treatment for the plateau area of the campus that recognizes its role in establishing a "first impression" of the University.
- Relocation and provision of additional parking areas.
- The design of parking lots as both safe and attractive areas at the campus "front door".
- Celebration of the natural environment of the campus through the preservation and reinforcement of natural areas.
- Creation of a pattern of circulation that emphasizes views to the Oldman River and draws people to the promontory lookout areas referred to as "sacred sites". These sites should be considered as locations for art installations, earth-works and other public amenities

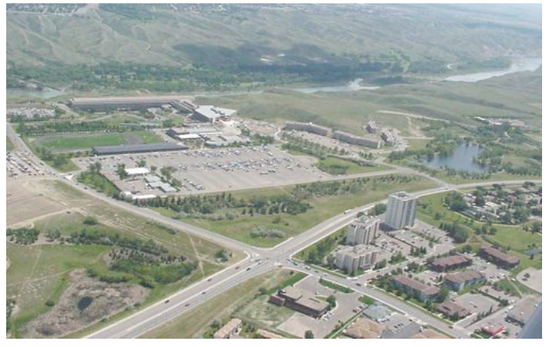


Figure 3.2: Existing gateway at Valley Road and University Drive

Figure 3.3: Preservation of existing vegetation. View of Chinese Elms on Service Road

Figure 3.4: Proposed pattern of buildings and circulation to emphasize “sacred sites”

4.0 CORE CAMPUS EXPANSION PLAN

4.1 An Illustrated Overview of Campus Design Concepts

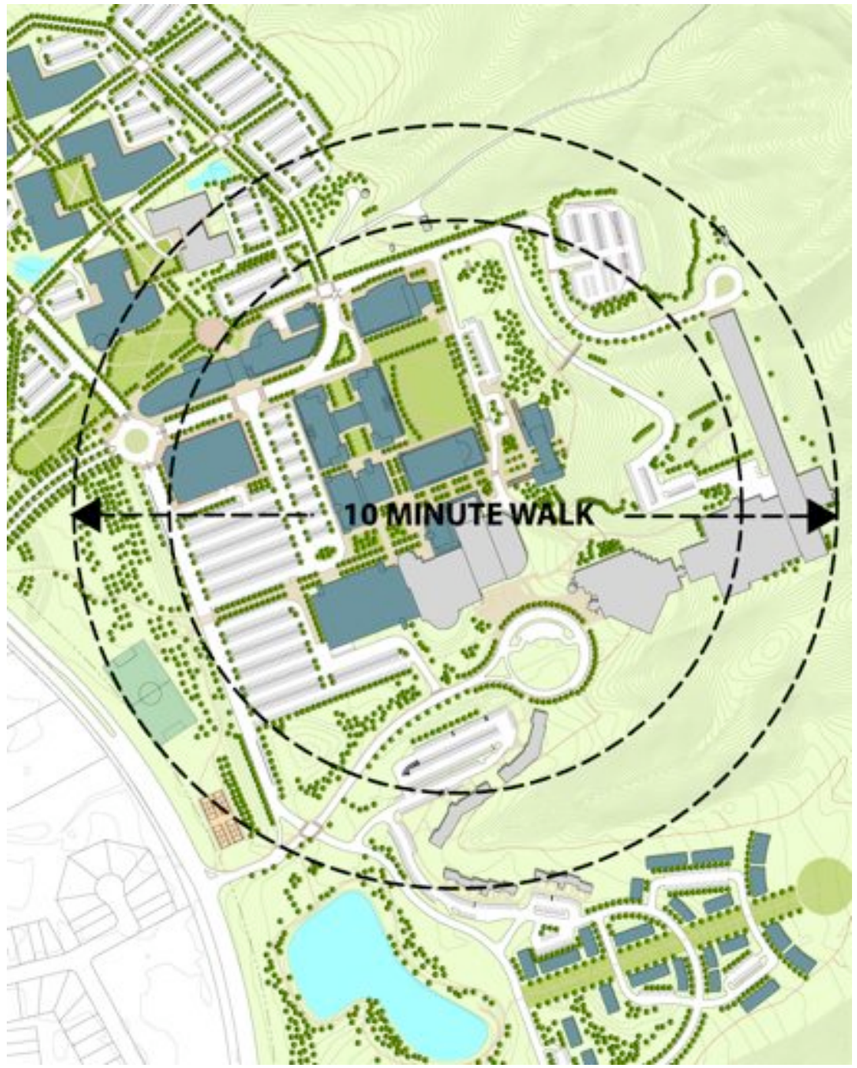


Figure 4.1: The opportunity to expand the campus within the 10 minute walking distance can be realized through the development of the plateau area east of Anderson Hall.

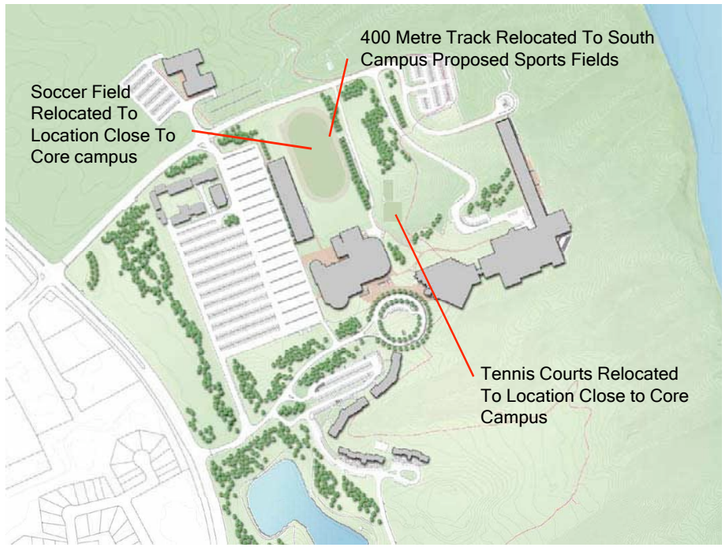


Figure 4.2: Existing site plan with proposed relocation of sports activities.

Figure 4.3: The promontory where the Tennis Courts are currently located is one of several "sacred sites" which should be preserved for uses of a public nature. The Expansion Plan recommends this as a potential site for an Exhibition Building (Art Gallery) combined with a University Club. Both uses would share a café/dining area and enjoy spectacular views east to University Hall and northeast to the Oldman River. The highlighted area illustrates the location for Building B. The opportunity to expand the campus within the 400 metre walking distance can be realized through the development of the plateau area east of Anderson Hall. The existing playing fields can be relocated both to the west and south.

Figure 4.4: With the potential for campus expansion to be positioned east of Anderson Hall, in the area currently occupied by the 400 meter track, new academic support and research buildings will easily be within the 10 minute walking distance. A new pedestrian bridge is recommended to link the north end of University Hall with the expansion area.

4.2 The Core Campus Expansion Plan

The following plans titled Phase 1 and 2 and accompanying text present the proposed expansion plan concept. It should be noted that while the plans are presented as phases and buildings are listed in alphabetical order the actual sequence of development need not neccesarily follow this order. For instance buildings for science research and teaching labs are recommended to be located in the Valley Road area (buildings C, D or E). If funding were available for this use in the near term these buildings could precede buildings A or B. In this scenario the development of a second Energy Centre will be required to service buildings in the Valley Road area. The Expansion Plan should be utilized as a flexible framework for growth allowing for multiple scenarios and evolving opportunities.

4.2.1 Phase 1

- The Campus Expansion Concept Plan provides for increased academic expansion within a 10 minute walk and a cohesive expansion framework that integrates new buildings within the existing campus.
- Phase I makes provisions for a University Centre; 38,800 gross square metres (gsm) of academic expansion in 5 building sites (buildings A ,B ,C ,D & E); Energy Centre #2 and the Art Gallery which may either be located on the promontory site (labelled Exhibition on the plan) or as part of the University Centre; for a total of 49,800 gsm of new building area.
- The University Centre (Field House with potential integration of the Art Gallery) is located west of the existing Phys.Ed. Building and is linked both at grade and at court level for expanded combined use of both facilities. A parking area of 100 stalls is provided adjacent to the University Centre dedicated for public use only.
- An east-west pedestrian walkway, lined with trees, is proposed to link the soccer and tennis area to the new University Centre and Phys. Ed. Building. The tree lined esplanade also links the parking areas to the West Court, a main entry point into the campus in the courtyard space defined by Turcotte Hall, Phys.Ed. and Anderson Hall.
- This pedestrian promenade extends further to the east to a proposed future University Club at one of the promontory sites which may also be jointly developed with the Art Gallery (labelled Exhibition on the plan) as an alternative site for the Gallery.
- A new pedestrian bridge spanning Coulee Trail links the upper campus to the north end of University Hall.
- Building A at 3 floors is the 2,400 gsm addition to Turcotte Hall (replacing the portables) and forms the main focus of the West Court.
- Building B at 3 floors provides 8,000 gsm of academic expansion defining the south end of the new Quad.
- The University Centre (Field House) at approximately 8,500 gsm and the Art Gallery at approximately 1,900 gsm could be combined as one facility or potentially separated as two distinct entities. The size of these facilities will be refined as their building program is developed.
- All four of these buildings can likely be serviced by adding heating and cooling capacity to the existing Energy Centre #1.
- The development of buildings in the Valley Road area (Buildings C, D and E) provide 8,000 gsm, 10,200 gsm and 10,200 gsm of building area respectively. Buildings D and E are separated at the two lower floors by a major pedestrian gateway linking the core campus to Exploration Place and the Research Green. The development of these 3 buildings would not proceed until a second Energy Centre (approximately 600 gsm) was built. It is proposed that Energy Centre #2 be located to the north of Building D to take advantage of the prevailing winds. A dedicated loading area is provided off of Valley Road to service the Energy Centre #2.
- Campus support functions currently housed in the service buildings should be relocated to provide for the realignment of Valley Road. New space for Printing, Materials Management and Facilities departments should be located in the area of Energy Centre #2, perhaps as part of the ground floor of Building D with direct access to the loading area. Carpentry, Shop and Grounds Maintenance departments could be accommodated in the south campus area.

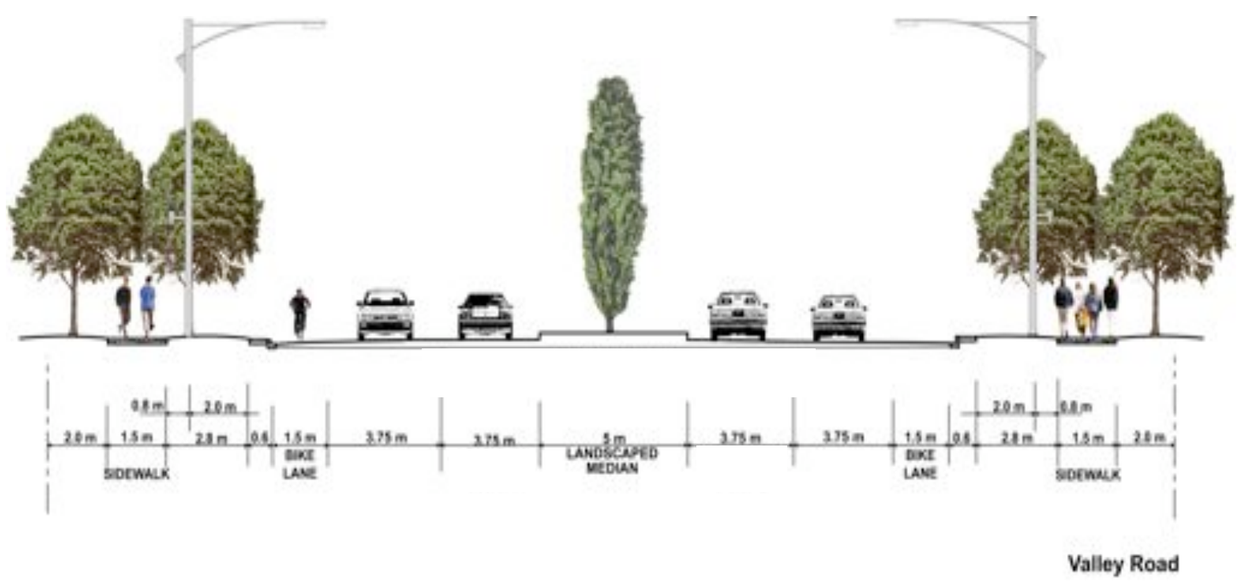


Figure 4.5: Cross section of proposed Valley Road redesign

- The realignment of Valley Road provides a stronger definition of the north campus entrance and allows direct views to the Quad and the heart of the campus. Bicycle lanes should be considered as part of the road pavement area. A 5 metre wide landscaped median is proposed in the roadway for the first segment of the realigned Valley Road. Double rows of trees framing sidewalks and pedestrian scale light standards are recommended on either side of the road (see Figure 4.5).

- A new intersection at Valley Road close to University Drive provides direct access to the West lot and Exploration Place parking areas. A roundabout intersection is proposed as a means of providing through movements to both the north and south parking areas.

- A new north-south road links the main campus to the athletic fields to the south and to Exploration Place to the north. Aperture Drive remains as a ceremonial entrance to the campus.

- Parking displaced by new buildings plus additional parking demand will be accommodated through surface parking lots on the lands north of Valley Road in the Exploration Place area.

4.2.2 Phase 2

- The area in the vicinity of Anderson Hall provides suitable sites for future infill buildings both east and west of Anderson Hall. This area continues to provide for academic expansion within the 10 minute walk by placing buildings in the area of the Quad.

- Additional academic and support building areas of 22,050 gsm can be provided in Buildings F, G and H and a dedicated Lecture Hall. In addition new research facilities would continue to be constructed at Exploration Place north of Valley Road. A total of 43,700 gsm of additional research space could be accommodated in this area.

- Most of the University's parking demand can be accommodated through the expansion of surface lots on the Exploration Place lands. However should parking demand continue at current levels it would likely be necessary to build a parking structure in the vicinity of Hepler Hall to allow for final build-out. Adequate parking could theoretically be provided to serve the full campus population of 11,300 through surface lots if for

Figure 4.6: Phase 1

instance one of the Exploration Place buildings was eliminated and used instead for more surface parking. The disadvantage of locating even more parking in this area, to serve the core campus, is the distance required to walk from these lots to the main campus. It is likely that the University will require a facility closer to the core area in the form of a parking garage (providing approximately 600 stalls) as the campus approaches full build-out. A component of the ground floor of the proposed 4 level parking structure is suitable for use as office or campus commercial-type uses. Approximately 50% of the lower floor (2,700 gsm) should be dedicated for active building occupancy to provide animation and safety at the Valley Drive campus entrance. The parking structure will likely not be required until the final phases of campus expansion. At this time Hepler Hall would be removed (its function would be accommodated in one of the new buildings) to provide a large enough site for the new parking structure. Initiatives to reduce parking demand should also be pursued, including improvements in transit service with incentives for increasing ridership and the development of more on-campus housing.

- Based on the scenarios presented in the accompanying plans the new building area for academic, support and research buildings within the 10 minute zone is approximately 67,000 gross square metres assuming building heights of 3 and 4 floors. This represents a 52% increase in gross building area. Expansion in this area will have a direct impact on the University's ability to support enrolment growth.

- Further development of Exploration Place will provide an additional 43,700 gsm of new building area beyond the 10 minute zone. Expansion in this area is presumed to be for dedicated research uses and/ or non-University institutions which will have little impact on the University's ability to support enrolment growth.

- The combined expansion both within and beyond the 10 minute zone provides 110,700 gsm of new building area (excluding residences) representing an increase of approximately 87% from the present 127,700 gsm of on-campus buildings.

- Expansion to the Aperture Park Residential Village is also illustrated in Figure 2.2. Assuming a split-level building format, approximately 15,000 gsm of new residence buildings yielding 600 beds could be comfortably provided in this area.

Figure 4.7: Phase 2

Figure 4.8: Overview from east

Figure 4.9: Overview from the southeast

Figure 4.10: Overview from the north

Figure 4.11: Overview from the southwest

Figure 4.12: View of realigned Valley Road and north enrtance to campus

Figure 4.13: View of the Quad

Figure 4.14: View from above University Hall towards the Quad

Figure 4.15: View from above Univesity Drive to east-west pedestrian route through the west parking lot

Figure 4.16: View from Oldman River

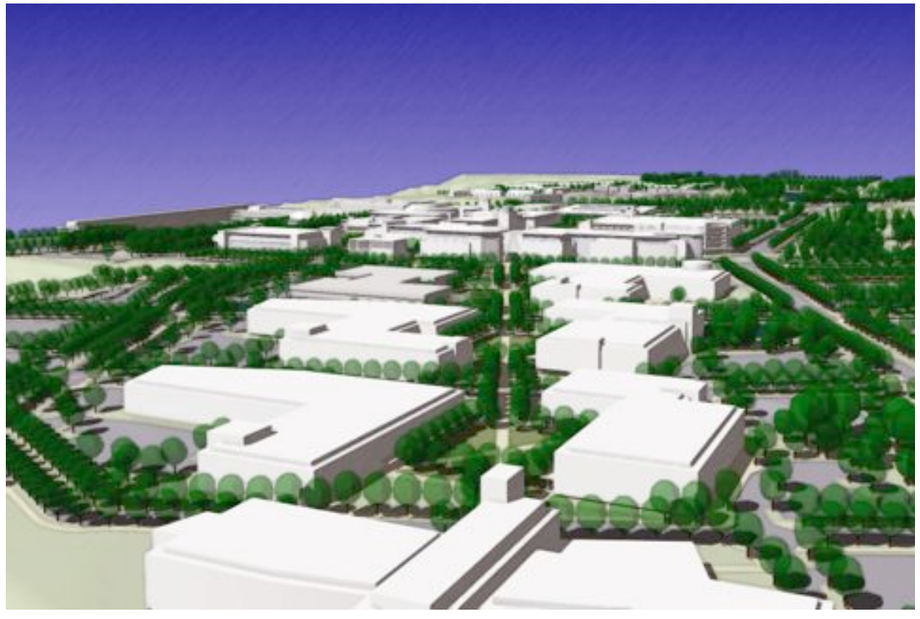


Figure 4.17: View of Exploration Place looking south to the core campus

Figure 4.18: North entrance to the campus

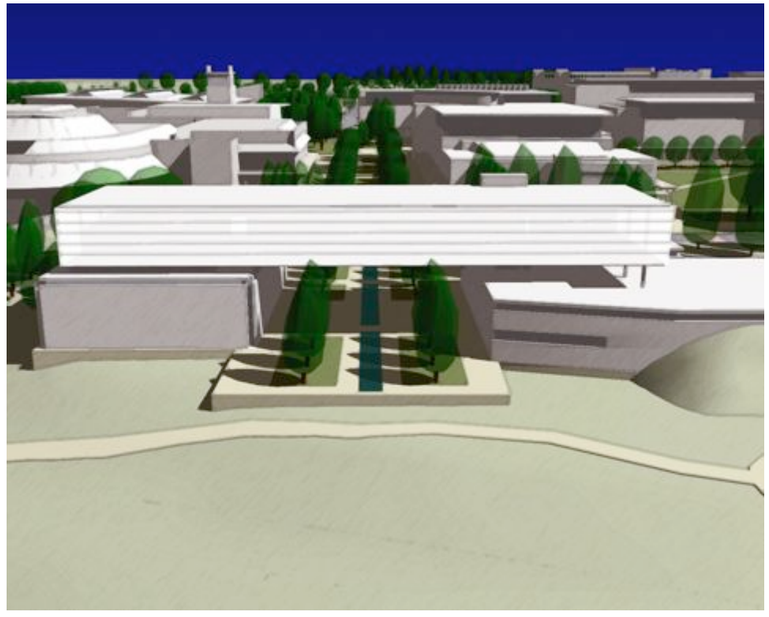


Figure 4.19: View of combined University Club and Art Gallery with a shared dining area (glass pavilion) on the second level

Figure 4.20: Proposed pedestrian path through the existing berm at Vallley Road entrance.

Figure 4.21: Pedestrian "promenade" showing Turcotte Hall on the right and Building B on the left.

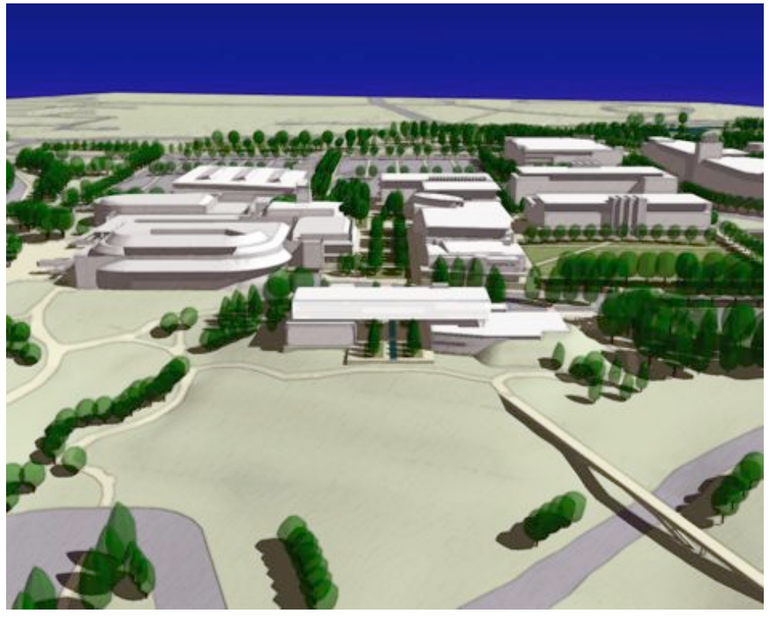


Figure 4.22: A new pedestrian bridge is proposed to link the University Club (site of the existing tennis courts) and the upper campus to the north end of University Hall.

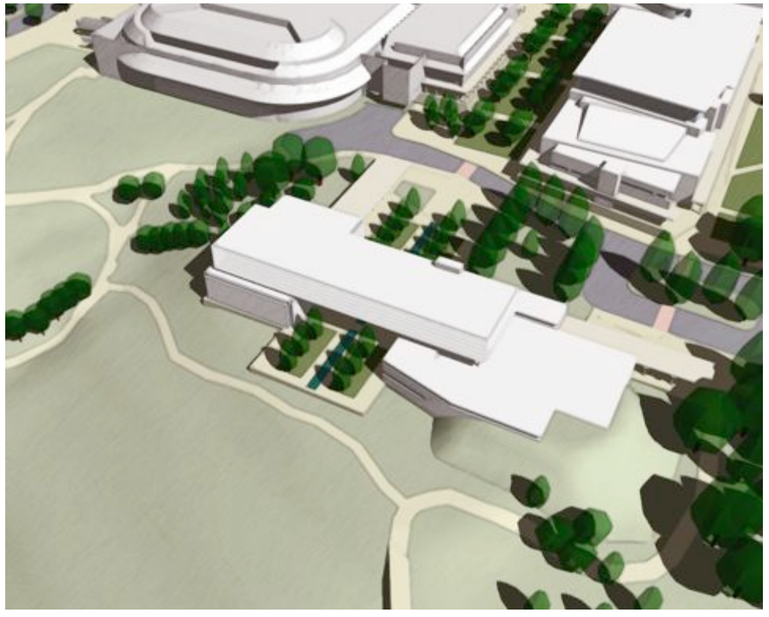


Figure 4.23: The east-west pedestrian promenade is shown here extending through to the promontory site with a combined University Club/Art Gallery and shared dining pavilion as a bridge element.

Figure 4.24: View north through "portal" between Building D and E to Exploration Place

Figure 4.25: View south through "portal" to the core campus

Figure 4.26: West view of realigned Valley Road

Figure 4.27: Northwest view of buildings D and E

5.0 CAMPUS GROWTH AND SPACE NEEDS

5.1 Overview

Presently the campus provides approximately 127,700 gross square metres (gsm) of academic support and research space (Table 1). Residential building area constitutes 16,800 gsm.

In the 2001-02 academic year these facilities currently support a total campus population of approximately 7,155 (6,100 students and 1,055 staff). Academic, support and research space is therefore currently provided at an average of 17.85 metres per person.

The University prepared a Space Needs Study in March 2001. Space needs were compiled as a result of department-by-department consultations that resulted in the identification of the need for approximately 24,000 gsm of additional academic space by the 2005-06 year. This figure in part reflected a potential projected growth rate in enrolment averaging 8.3%.

Additional facilities identified in the Space Needs Report included:

- A Field House to provide athletic and wellness facilities for University and community users ;
- University of Lethbridge Art Gallery (1,900 gsm);
- Child Care Facility (area to be determined);
- Additional residences; and,
- Additional support facilities.

The specific building programs and funding sources for these facilities are still to be determined and are the subject of separate studies either in progress or to be initiated in the future.

Priorities for academic expansion identified in the Space Needs report included space for Management (6,400 gsm) and Math & Computer Sciences (2,015 gsm) as well as significant additional instructional and research lab space. Subsequent investigation also identified the limitations of the present energy plant, which through upgrading can potentially support an additional 20,000 gsm of building area. Expansion of the core campus will therefore require the need for a second energy plant in the future.

Through the consultation process undertaken as part of this study a number of other potential facilities were identified as desirable.

- First Nations Students' Centre
- International Students' Centre
- University Club (Dining)
- Bookstore and University Store
- Alumni Centre
- Café

It should be noted that these facilities have not been considered by the University's Administration or Board of Governor's nor have building programs or funding sources been identified. They are therefore provided here for future consideration only as the campus grows and are currently not considered priority expansion facilities.

Table 1: University of Leithbridge Main Campus Space Inventory *

	Academic		Support		Research		Residence	
	Gross s.m.	Net s.m.	Gross s.m.	Net s.m.	Gross s.m.	Net s.m.	Gross s.m.	Net s.m.
Anderson Hall	4,502	2,839						
Art Vault			675	622				
Building Maintenance			322	303				
Canadian Centre for Behavioural Neurosciences					3,869	2,205		
Green House					124	109		
Grounds Maintenance			297	286				
Hepler Hall					769	620		
Kainai House							5,507	3,727
Library	23,488	12,985						
Library Storage			188	182				
Observatory	36	29						
Phys. Ed.			9,644	5,503				
Phys. Ed. Storage			54	52				
Piikani House							5,417	3,708
Portables (Turcotte)	682	400						
Aquatic Centre			4,740	2,796				
Remote Research					151	125		
Remote Storage			63	55				
Service Building #1			932	715				
Service Building #2			607	440				
Service Building #4			980	839				
Service Building #5			197	150				
Service Building #6			280	270				
Siksika House							3,250	2,363
Student Union			8,699	5,906				
Tsuu T'ina House							2,594	1,911
Turcotte Hall	2,726	1,522						
University Centre for the Arts	27,880	12,290						
University Hall	35,271	17,580					4,907	2,853
Walkway Tunnel			508	508				
Waterchamber North			24	24				
TOTAL per Category	94,585	47,645	28,210	18,651	4,913	3,059	21,675	14,562

TOTAL GROSS Academic/ Support/ Research (excl. Residential) = **127,708**

* In multi use buildings, the space has been placed in the predominant use /functional category

The following desired characteristics for new facilities were also identified.

- Building modules should allow for incremental growth.
- Flexibility in building design to allow for adaptation.
- Energy efficiency.
- Provision for some larger lecture halls in the 200-seat range.
- Departmental lounges.
- Weather protected links.

5.2 Campus Expansion Capacity

The subject of the ultimate size of the University of Lethbridge's enrolment is presently a point of discussion within the U of L community. Clearly this is a complex issue that requires a policy approach that addresses the University's role and objectives. While the University has built its reputation on its intimate scale and small class size these patterns are being challenged by virtue of recent growth rates and funding models. It is beyond the role of this study to comment on an appropriate ultimate University population.

The findings of the study can however, serve as useful input in assessing the potential limits of growth that can be reasonably and affordably accommodated on campus. This exercise involves:

- calculating potential new academic space on campus within a reasonable (10 minute) walking distance;
- estimating the additional campus population that this new space will accommodate; and,
- the amount of parking (and land area) which will be required to reasonably service this population.

Factors which affect the land available for new building area include:

- the desire to maintain a strong campus identity through a network of open green spaces both within the campus and at its periphery;
- the accommodation of parking through surface lots to as great an extent as possible – recognizing that structured parking is an expensive undertaking; and,
- topographic and geotechnical constraints.

Additional factors that regulate the size of buildings include the desire to provide reasonably scaled building heights (3 to 4 floors) that complement the aesthetics of the campus. Buildings in this height range are compatible with existing facilities in the upper campus area such as Turcotte Hall, Phys. Ed., and the Aquatic Centre. Buildings higher than this may detract from the existing image of the campus as a series of strong horizontal planes particularly as viewed from across the River. The Expansion Plan reflects a desire to maintain a human scale to new buildings and to create sheltered courtyard spaces which allow for sunlight penetration. Buildings lower than three floors however yield too little density for the amount of land consumed and were therefore felt to be wasteful of the limited buildable land available for campus expansion within the 10 minute walking zone. Buildings beyond the 10 minute zone at Exploration Place were considered to average 2 floors recognizing the need for additional floor to floor heights usually required for mechanical systems for research lab uses.

The Campus Expansion Concept Plan presented in Figures 4.6 and 4.7 provides approximately 67,000 gross square metres (gsm) of additional academic, support and research space to the existing campus. As a point of comparison the combined gross building area of University Hall and the Centre for the Arts is approximately 68,000 gsm.

Table 2 provides a breakdown of new academic and support space areas as illustrated in the plans. "New Academic Buildings" (as listed in the table) are considered to be buildings within the 10 minute walking zone which accommodate academic, support and research functions. Eight major building sites (Buildings A - H) are identified which are suitable for academic expansion. Other specific uses include: the University Centre (Field House potentially incorporating additional components including the Art Gallery); University Club and Exhibition Facility (the term Exhibition facility refers to the potential of an Art Gallery as a component separate from the Field House); and, the Energy Centre #2. Also included in the building area summary is a component of the ground floor of the proposed parking structure suitable for use as office or campus commercial-type uses. Approximately 50% of the lower floor (2,700 gsm) should be dedicated for active building occupancy to provide a sense of animation and safety at the Valley Drive campus entrance. The parking structure will likely not be required until the final phases of campus expansion. At that time Hepler Hall would be removed (its function would be accommodated in one of the new buildings) to provide a large enough site for the new parking structure.

This 67,000 gsm of new expansion space in addition to existing academic, support and research areas provides for a total of 192,770 gsm. Using an average ratio of 17.85 gross square metres of building area per person (the rate for the 2001-2002 year) this will support a campus population of 10,800.

Table 2 also provides a breakdown of Exploration Place expansion. New research buildings totalling 43,700 gross square metres (gsm) of building area can be provided utilizing an average of 2 storey buildings. This new space in addition to the Canadian Centre for Behavioural Neurosciences provides for a total Exploration Place build-out of 48,300 gsm.

Additional research space at Exploration Place will also support additional campus population but at a much reduced rate. Of the total 47,750 gsm of new research space projected for Exploration Place we have assumed that approximately 33% could be considered to have a direct impact on the University's ability to accommodate increased student enrolment. The remaining area is assumed to be too physically remote from the core campus and more likely to accommodate allied, but independent research institutions or corporations.

The ability for 33% of the space at Exploration Place to accommodate campus population would also be at a reduced ratio estimated at 30 square metres of building area per person

reflecting the intensity of space used for equipment and support functions. This suggests that the Exploration Place component would support an additional 525 persons bringing the total population to approximately 11,325 persons.

The plan also illustrates the development of new housing in the Residential Village area providing for approximately 15,000 gsm or 600 beds.

5.3 Phasing Scenarios

An analysis of potential phasing scenarios has been prepared and is presented in Tables 3 to 9. The phasing of academic expansion is of course conditioned by rates of increase in enrolment and by levels of financial support for new buildings. The increase in enrolment from the Fall 2000-01 to Fall 2001-02 years was 3.7%. However projections for potential future growth rates range as high as 8%. The Tables therefore examine seven growth rates ranging from 2% to 8% and itemize the annual space needs required to meet increased enrolment.

The results of this analysis show that if the annual campus population grows at a rate ranging from 2% to 3% (Tables 3 and 4) a reasonable pace of construction could be implemented resulting in a full build out from 23 to 16 years (i.e. if annual growth occurs at a rate of 2% build-out will occur in 21 years; growth at 3% would result in a 14 year build-out period).

Growth rates in the 4% to 5% range (Tables 5 and 6) will generally require a new building to come on stream every year and a full build-out of the campus would be achieved from 12 to 10 years.

Growth rates in the 6% to 8% range (Tables 7, 8 and 9) would result in an extremely condensed construction program, which is likely to see multiple buildings constructed annually and significant disruption of the campus. Full build-out would be achieved within 8 to 6 years.

The specific needs for classrooms, class labs, research labs, offices and support space need to be monitored on an on-going basis with new construction geared to accommodate anticipated shortfalls. Since the imminent renovation of the former Library space will only accommodate classrooms, computer labs and offices, the focus on the short-term may be on meeting requirements for other types of space.

Table 2 :Academic/Support/Research Building Expansion Summary

Phase I:			
Existing Buildings		Gross s.m.	# of Floors
As per Table 1		**127,708**	
New Buildings		Gross s.m.	# of Floors
New Academic Buildings	A	2,400	3
	B	8,000	3
	C	8,000	3
	D	10,200	4
	E	10,200	4
University Centre (Field House)		8,500	2
Exhibition (Art Gallery)		1,900	2
Energy Centre # 2		600	2
Sub-Total New Academic		**49,800**	
New Exploration Place Buildings	EP-2	9,600	2
	EP-3	7,900	2
Sub-Total New Exploration Place		**17,500**	
Sub-Total All New Buildings (Phase I)		**67,300**	
Obsolete Buildings		Gross s.m.	
Service Building	1	-932	
Service Building	2	-607	
Service Building	4	-980	
Service Building	5	-197	
Service Building	6	-280	
Portables (Turcott)		-682	
Total Obsolete Buildings		**-3,678**	
TOTAL PHASE I		**63,622**	

Phase II:			
New Buildings		Gross s.m.	# of Floors
New Academic Buildings	F	6,000	3
	G	8,000	4
	H	7,300	3--4
Lecture Hall		750	1
University Club		1,400	1
Parking Garage Office/Commercial		2,700	4
Sub-Total New Academic		**26,150**	
New Exploration Place Bildings	EP-4	5,100	2
	EP-5	5,100	2
	EP-6	6,300	2
	EP-7	9,700	2
Sub-Total New Exploration Place		**26,200**	
Sub-Total All New Buildings (Phase II)		**52,350**	
Obsolete Buildings		Gross s.m.	
Hepler Hall		-769	
Anderson Hall		-4,503	
Total Obsolete Buildings		-5,272	
TOTAL PHASE II		**47,078**	

Total Phase I & II	**110,700**
Grand Total	**238,408**
(Phase I, II, and Existing Building Area)	

Table 3: Projections for 2% Growth After 20001-2002

Year ⇨		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27	27-28	28-29	29-30	30-31
Average annual population growth	Student Pop	6,100	6,222	6,346	6,473	6,603	6,735	6,870	7,007	7,147	7,290	7,436	7,585	7,736	7,891	8,049	8,210	8,374	8,541	8,712	8,887	9,064	9,246	9,430	9,619	9,811	10,008	10,208	10,412	10,620	10,833
	Staff Pop	1,055	1,076	1,098	1,120	1,142	1,165	1,188	1,212	1,236	1,261	1,286	1,312	1,338	1,365	1,392	1,420	1,448	1,477	1,507	1,537	1,568	1,599	1,631	1,664	1,697	1,731	1,765	1,801	1,837	1,874
	Total Pop	7,155	7,298	7,444	7,593	7,745	7,900	8,058	8,219	8,383	8,551	8,722	8,896	9,074	9,256	9,441	9,630	9,822	10,019	10,219	10,423	10,632	10,845	11,061	11,283	11,508	11,739	11,973	12,213	12,457	12,706
Space per person ratio (mpp)		17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85
Total Space Need (s.m.)		127,708	130,271	132,877	135,534	138,245	141,010	143,830	146,706	149,641	152,633	155,686	158,800	161,976	165,215	168,520	171,890	175,328	178,834	182,411	186,059	189,780	193,576	197,447	201,396	205,424	209,533	213,724	217,998	222,358	226,805
Parking Demand (.3 spaces/person)		2,147	2,189	2,233	2,278	2,323	2,370	2,417	2,466	2,515	2,565	2,617	2,669	2,722	2,777	2,832	2,889	2,947	3,006	3,066	3,127	3,190	3,253	3,318	3,385	3,453	3,522	3,592	3,664	3,737	3,812
Annual Space Need (sm)			2,563	2,605	2,658	2,711	2,765	2,820	2,877	2,934	2,993	3,053	3,114	3,176	3,240	3,304	3,370	3,438	3,507	3,577	3,648	3,721	3,796	3,872	3,949	4,028	4,108	4,191	4,274	4,360	4,447
Accumulated Annual Space Need (sm)				5,169	7,826	10,537	13,302	16,122	18,998	21,933	24,925	27,978	31,092	34,268	37,507	40,812	44,182	47,620	51,126	54,703	58,351	62,072	65,868	69,739	73,688	77,716	81,825	86,016	90,290	94,650	99,097

Approximate year to reach campus population of 11,300 ▲

Table 4: Projections for 3% Growth After 2001-2002

Year ⇨		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21
Average annual population growth	Student Pop	6,100	6,283	6,471	6,666	6,866	7,072	7,284	7,502	7,727	7,959	8,198	8,444	8,697	8,958	9,227	9,504	9,789	10,082	10,385	10,696
	Staff Pop	1,055	1,087	1,119	1,153	1,187	1,223	1,260	1,298	1,336	1,377	1,418	1,460	1,504	1,549	1,596	1,644	1,693	1,744	1,796	1,850
	Total Pop	7,155	7,370	7,591	7,818	8,053	8,295	8,543	8,800	9,064	9,336	9,616	9,904	10,201	10,507	10,823	11,147	11,482	11,826	12,181	12,546
Space per person ratio (mpp)		17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85
Space Need (s.m.)		127,708	131,548	135,495	139,560	143,746	148,059	152,500	157,075	161,788	166,641	171,641	176,790	182,094	187,556	193,183	198,979	204,948	211,096	217,429	223,952
Parking Demand (.3 spaces/person)		2,147	2,211	2,277	2,346	2,416	2,488	2,563	2,640	2,719	2,801	2,885	2,971	3,060	3,152	3,247	3,344	3,445	3,548	3,654	3,764
Annual Space Need (sm)			3,840	3,946	4,065	4,187	4,312	4,442	4,575	4,712	4,854	4,999	5,149	5,304	5,463	5,627	5,795	5,969	6,148	6,333	6,523
Accumulated Annual Space Need (sm)				7,787	11,852	16,038	20,351	24,792	29,367	34,080	38,933	43,933	49,082	54,386	59,848	65,475	71,271	77,240	83,388	89,721	96,244

Approximate year to reach campus population of 11,300 ▲

Table 5: Projections for 4% Growth After 2001-2002

Year ⇨		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
Average annual population growth	Student Pop	6100.00	6344.00	6597.76	6861.67	7136.14	7421.58	7718.45	8027.18	8348.27	8682.20	9029.49	9390.67	9766.30	10156.95	10563.23	10985.76
	Staff Pop	1055.00	1097.20	1141.09	1186.73	1234.20	1283.57	1334.91	1388.31	1443.84	1501.59	1561.66	1624.12	1689.09	1756.65	1826.92	1900.00
	Total Pop	7155.00	7441.20	7738.85	8048.40	8370.34	8705.15	9053.36	9415.49	9792.11	10183.80	10591.15	11014.79	11455.39	11913.60	12390.14	12885.75
Space per person ratio (mpp)		17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85
Space Need (s.m.)		127708.00	132825.42	138138.44	143663.97	149410.53	155386.95	161602.43	168066.53	174789.19	181780.76	189051.99	196614.07	204478.63	212657.78	221164.09	230010.65
Parking Demand (.3 spaces/person)		2146.50	2232.36	2321.65	2414.52	2511.10	2611.55	2716.01	2824.65	2937.63	3055.14	3177.34	3304.44	3436.62	3574.08	3717.04	3865.73
Annual Space Need (sm)			5,117	5,313	5,526	5,747	5,976	6,215	6,464	6,723	6,992	7,271	7,562	7,865	8,179	8,506	8,847
Accumulated Annual Space Need (sm)				10,430	15,956	21,703	27,679	33,894	40,359	47,081	54,073	61,344	68,906	76,771	84,950	93,456	102,303

Approximate year to reach campus population of 11,300 ▲

Table 6: Projections for 5% Growth After 2001-2002

Year ⇨		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14
Average annual population growth	Student Pop	6,100	6,405	6,725	7,062	7,415	7,785	8,175	8,583	9,012	9,463	9,936	10,433	10,955
	Staff Pop	1,055	1,108	1,163	1,221	1,282	1,346	1,414	1,484	1,559	1,637	1,718	1,804	1,895
	Total Pop	7,155	7,513	7,888	8,283	8,697	9,132	9,588	10,068	10,571	11,100	11,655	12,237	12,849
Space per person ratio (mpp)		17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85
Space Need (s.m.)		127,708	134,103	140,808	147,848	155,241	163,003	171,153	179,710	188,696	198,131	208,037	218,439	229,361
Parking Demand (.3 spaces/person)		2,147	2,254	2,367	2,485	2,609	2,740	2,877	3,020	3,171	3,330	3,496	3,671	3,855
Annual Space Need (sm)			6,395	6,705	7,040	7,392	7,762	8,150	8,558	8,986	9,435	9,907	10,402	10,922
Accumulated Annual Space Need (sm)				13,100	20,140	27,533	35,295	43,445	52,002	60,988	70,423	80,329	90,731	101,653

Approximate year to reach campus population of 11,300 ▲

Table 7: Projections for 6% Growth After 2001-2002

Year ⇨		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12
Average annual population growth	Student Pop	6,100	6,466	6,854	7,265	7,701	8,163	8,653	9,172	9,722	10,306	10,924
	Staff Pop	1,055	1,118	1,185	1,257	1,332	1,412	1,497	1,586	1,682	1,782	1,889
	Total Pop	7,155	7,584	8,039	8,522	9,033	9,575	10,150	10,758	11,404	12,088	12,814
Space per person ratio (mpp)		18	18	18	18	18	18	18	18	18	18	18
Space Need (s.m.)		127,708	135,380	143,503	152,113	161,239	170,914	181,169	192,039	203,561	215,775	228,721
Parking Demand (.3 spaces/person)		2,147	2,275	2,412	2,557	2,710	2,873	3,045	3,228	3,421	3,626	3,844
Annual Space Need (sm)			7,672	8,123	8,610	9,127	9,674	10,255	10,870	11,522	12,214	12,946
Accumulated Annual Space Need (sm)				15,795	24,405	33,531	43,206	53,461	64,331	75,853	88,067	101,013

Approximate year to reach campus population of 11,300 ▲

Table 8: Projections for 7% Growth After 2001-2002

Year ⇨		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11
Average annual population growth	Student Pop	6,100	6,527	6,984	7,473	7,996	8,556	9,154	9,795	10,481	11,215
	Staff Pop	1,055	1,129	1,208	1,292	1,383	1,480	1,583	1,694	1,813	1,940
	Total Pop	7,155	7,656	8,192	8,765	9,379	10,035	10,738	11,489	12,294	13,154
Space per person ratio (mpp)		17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85
Space Need (s.m.)		127,708	136,657	146,223	156,459	167,411	179,129	191,668	205,085	219,441	234,802
Parking Demand (.3 spaces/person)		2,147	2,297	2,458	2,630	2,814	3,011	3,221	3,447	3,688	3,946
Annual Space Need (sm)			8,949	9,566	10,236	10,952	11,719	12,539	13,417	14,356	15,361
Accumulated Annual Space Need (sm)				18,515	28,751	39,703	51,421	63,960	77,377	91,733	107,094

Approximate year to reach campus population of 11,300 ▲

Table 9: Projections for 8% Growth After 2001-2002

Year ⇨		01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10
Average annual population growth	Student Pop	6100	6588	7115	7684	8299	8963	9680	10454	11291
	Staff Pop	1055	1139	1231	1329	1435	1550	1674	1808	1953
	Total Pop	7155	7727	8346	9013	9734	10513	11354	12262	13243
Space per person ratio (mpp)		17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85	17.85
Space Need (s.m.)		127708	137934	148969	160886	173757	187658	202670	218884	236395
Parking Demand (.3 spaces/person)		2147	2318	2504	2704	2920	3154	3406	3679	3973
Annual Space Need (sm)			10,226	11,035	11,918	12,871	13,901	15,013	16,214	17,511
Accumulated Annual Space Need (sm)				21,261	33,178	46,049	59,950	74,962	91,176	108,687

Approximate year to reach campus population of 11,300 ▲

5.4 Parking

Parking demand projections are based on the Reid Crowther report of February 2000, which estimates parking demand ranging from 0.26 to 0.30 stalls per member of campus population. Currently the campus has 2957 stalls for a campus population of 7155 or 0.41 stalls per person with some surplus stalls available for Exploration Place and the Far West lots.

Based on 0.30 stalls per person parking demand for a campus population of 11,325 is estimated at 3400 stalls. An additional 100 stalls are recommended as dedicated parking for public use only adjacent to the University Centre (Field House).

Additional parking demand for Exploration Place is estimated at 500 stalls (47,700 gsm subtract the 33% space accounted for in the campus population projection equation = 31,960 gsm at a 1.71 gross to net factor = 18,690 net square metres at 2.7 stalls per 100 net sm = 505 stalls).

This produces a total estimated parking demand of 4,000 stalls.

Total surface parking of 3,580 stalls can be achieved upon full build-out of the upper campus and Exploration Place as illustrated in the Expansion Plan concept.

The short-fall of 420 stalls can be accommodated with a 4 level parking structure located in the West parking lot in the area presently occupied by Hepler Hall if the building has reached the end of its useful lifecycle by the time a structure is required to accommodate parking demand. The garage will have to provide for the 420 stall shortfall plus an additional 150 surface stalls that will be displaced by the new structure for a total of 570 stalls. A garage size of 60 metres by 90 metres can provide approximately 200 stalls per level. A four level structure is therefore recommended to provide 600 stalls on the upper three levels and a ground floor dedicated to garage circulation, support, short-term parking and occupancy space including support and retail space in order to present an active building edge at grade. The garage may only be necessary upon full build-out of Exploration Place as the undeveloped portion of the research park lands can be used as interim surface parking lots. Design of any parking structure should provide for the ability to expand upward up to a maximum of six levels consistent with the height of a four story academic building.

5.5 Growth Beyond A Campus Population of 11,300

Additional building area beyond that projected in the recommended expansion plan is possible. For instance the addition of an extra building level to the 3 and 4 floors illustrated in the expansion plan concept would yield an additional 17,000 gsm. This in turn would support an additional population of 950 for a campus population approximating 12,300. However this will likely trigger an increased need for structured parking.

The potential addition of an east-west building component at the north end of University Hall as, recommended by Watson Horton Ferrari (cited p. 22: John Andrews International “The University of Lethbridge Campus Development Plan Review” December 1993) would also be a potential location for additional building area. In reviewing this option the prospect of enclosure of the north end of the coulee valley with a multi-storey building would create an inhospitable and relatively unusable open space area. The change in grade (26 + metres) which the building would have to negotiate in addition to geotechnical and construction issues make this option both expensive, and in our opinion, environmentally problematic.

6.0 DESIGN GUIDELINES

6.1 Building Design

The following building design guidelines have been prepared to assist those involved in the design of future campus buildings to contribute to the creation of a cohesive, high-quality campus image. The following guidelines should be used as a general guiding framework. In certain circumstances the specific opportunities of a building design may present an approach which is not anticipated in these guidelines. The intent therefore is not to create a rigid set of rules which must be adhered to in all circumstances. The spirit of the following recommendations is to suggest an overall “quality context” which will hopefully inspire architectural excellence and innovation.

- New buildings should contribute to the tradition of architectural excellence which the University is known for. Building design should utilize an architectural vocabulary that complements existing buildings utilizing materials such as light coloured precast concrete, natural and manufactured stone .

- In general a pattern of flat roof buildings should be encouraged to reinforce the strong horizontal and linear visual structure of the existing campus. This is consistent with the design of University Hall, the Centre for the Arts and LINC.

- Buildings are generally recommended to be three to four floors in height with most academic buildings ranging in size from 8,000 to 10,000 square metres. Buildings of this height and size allow for a steady pace of growth in keeping with anticipated funding increments. Lower building heights would consume valuable land within the 10 minute walking area and result in the displacement of parking. Buildings in the four storey range are compatible with existing buildings on the plateau whereas buildings higher than four levels could detract from the overall campus image of strong horizontal planes as viewed from across the River. Buildings of this scale incorporating appropriate setbacks and weather protective elements such as colonnades and canopies also contribute to a sense of human scale and promote the more active use of sheltered courtyard type outdoor spaces.

- Where possible building massing should articulate transitions from the pedestrian scale to higher floors through the use of setbacks at for instance the first floor or building base and at the upper floor or roof to give expression to the building cap.

- Taller building elements should be placed to terminate view corridors and mark key building entrances, gateways or significant public spaces.

- The use of clear glazing should be encouraged wherever possible. Low-E coated glazing with minimal tinting should be encouraged to promote visual connections between buildings and outdoor areas.

Figure 6.1: York University Student Union- a weather protected walkway flanks the building at the ground floor. Rolling garage doors can be opened during summer months to provide an open colonnade

Figure 6.2: York University Student Union- elevation with weather protected colonnade

- Where building edges are visually prominent and align courtyard spaces or significant pedestrian pathways, active building uses such as offices, lounges, food areas or interior circulation routes should be placed to overlook these outdoor areas and to provide increased animation, surveillance and safety.

- Blank building walls without entrances or loading areas should be oriented to have minimal exposure to public areas of the campus including pedestrian paths, roadways and courtyard spaces.

- The perimeter of buildings at ground level should incorporate where possible weather protected pedestrian circulation areas. These may be in the form of colonnades, overhangs or interior glazed corridors with operable doors or windows that may be opened for suitable weather (see figures 6.1 and 6.2).

- The concept plans and 3-D modelling are based on a series of building system and dimensional principles that are recommended for new campus buildings.

- Steel construction utilizing a 9 m x 10.6 m column grid is recommended as the most versatile module allowing for a range of instructional and non-instructional spaces.

- Building widths of both 36 metres (4 @ 9 metre bays) and 27 metres (3 @ 9 metre bays) are recommended. Buildings B and C as shown on the Concept Plan utilize the 36 metre width. Buildings D,E,F,G and H utilize the 27 metre width.

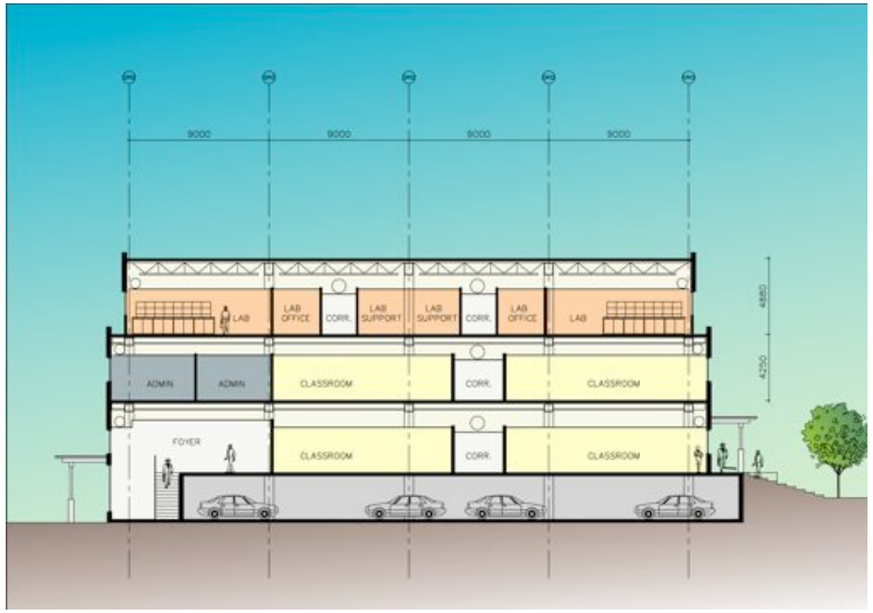


Figure 6.3: Building section illustrates a 36 metre building width utilizing 4 bays at 9 metres and potential below grade parking

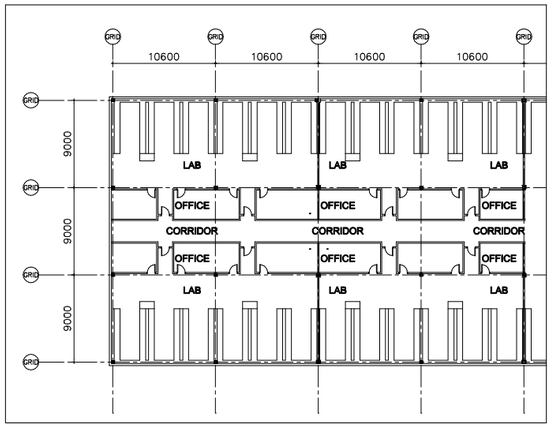


Figure 6.4: Plans illustrate the use of the 9 mx 10.6 m grid to accomodate science labs

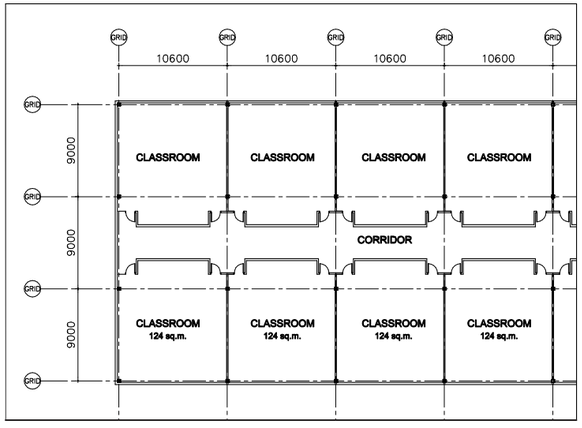


Figure 6.5: Plans illustrate the use of the 9 mx 10.6 m grid to accomodate classrooms (60-80 seats)

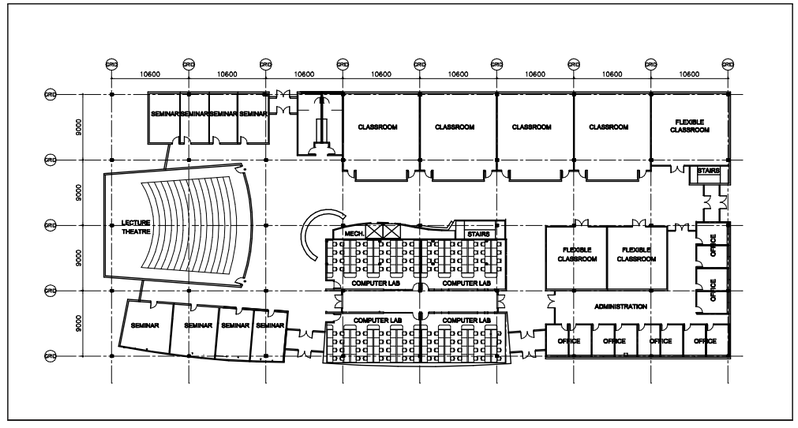


Figure 6.6: Building plans illustrating the flexibility of a 10.6 m x 9 m grid

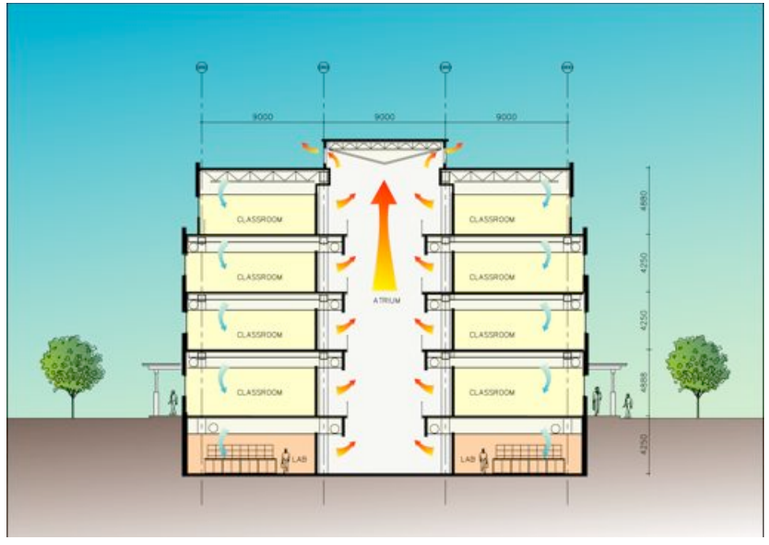


Figure 6.7: Section of building at light well/ventilization core

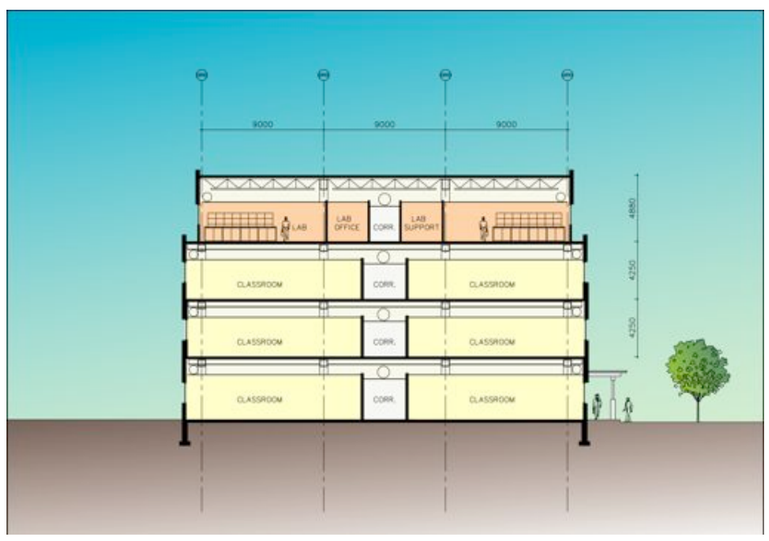


Figure 6.8: Four storey building

- Larger lecture theatres (200+ seats) that require clear spans beyond the 9 x 10.6 metre grid should be located at the ends of buildings as lower built form elements as illustrated in buildings B and C. These structures should only support roof loads.

- Buildings should be designed to reflect environmentally sustainable principles. Energy efficiency measures should be provided including provision of operable windows where possible. Lethbridge conditions including high winds and dust transmission may limit extensive use of operable windows however opportunities should be reviewed on a building by building basis. Other environmental measures include the use of sunlight shading louvres, and natural vertical ventilation cores to promote natural convection cooling. The 3-D modelling for the campus illustrates building systems incorporating sun shading devices, colonnades and vertical ventilation cores.

  New buildings on campus should be designed in accordance with the National Energy Code for Buildings. The budgeting process for new projects should recognize lifecycle costs of building structures and factor reduced future operating costs in the review of initial capital costs.

6.2 Site Design

The following guidelines propose treatments for the design of parking areas, pedestrian pathways and road networks on campus.

6.2.1 Parking

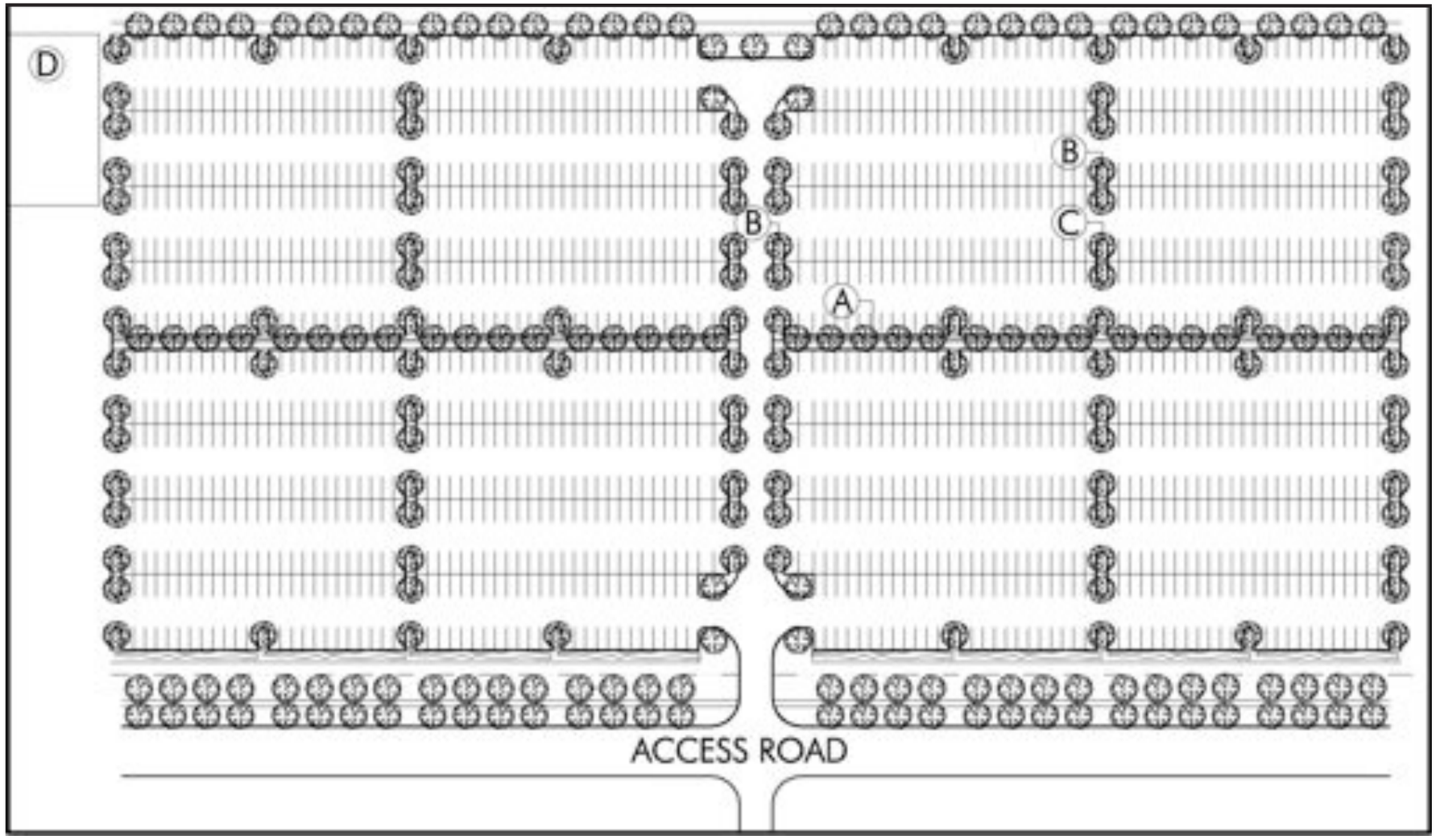
Large parking lots should incorporate landscaped elements to assist in reducing the visual scale of the parking field into smaller areas. Landscaped islands should be placed at the ends of all aisles and should provide one tree per parking aisle.

Parking islands should be a minimum of 2.5 metres wide and should be planted with hardy, high canopy trees and irrigated.

Large parking areas should where possible provide tree lined pedestrian sidewalks to link to building entrances.

Where parking lots abut public areas and routes the visual presence of the parking area should be mitigated through the planting of low shrubs and/ or berming up to a maximum height of 1.0 metre at the perimeter of the lot.

Parking garages should be designed as architectural elements in a manner compatible with the architectural qualities of campus buildings. Where possible the ground floor of the garage should incorporate active building uses (office or retail uses) to assist in the animation of the surrounding area. Vertical circulation areas should be designed with maximum amounts of glazing and should be placed in a manner which promotes visibility and safety.



PARKING STANDARDS

A Parking lot side walks minimum 3.5 M wide with sidewalk trees and pedestrian lighting at 8 metres on-centre.

B Landscape islands at the ends of all parking rows. Minimum 2.5 metres wide . One tree for every parking row.

C Minimum of one landscaped parking island per row for every 20-30 parking stalls.

D Snow storage area to be provided contiguous to parking lots.

Figure 6.9:.Guidlines for parking lots illustrating principles for tree planting and pedestrian walkways.

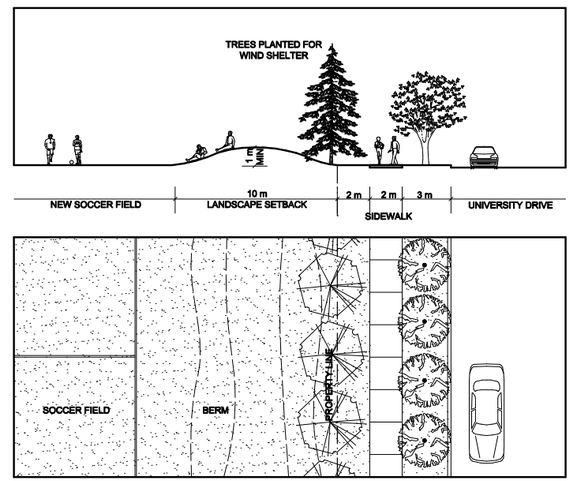


Figure 6.10: A low berm (maximum 1.0 metre height) and tree planting at the location of the new soccer field adjacent to University Drive provides wind shelter for the sports field.

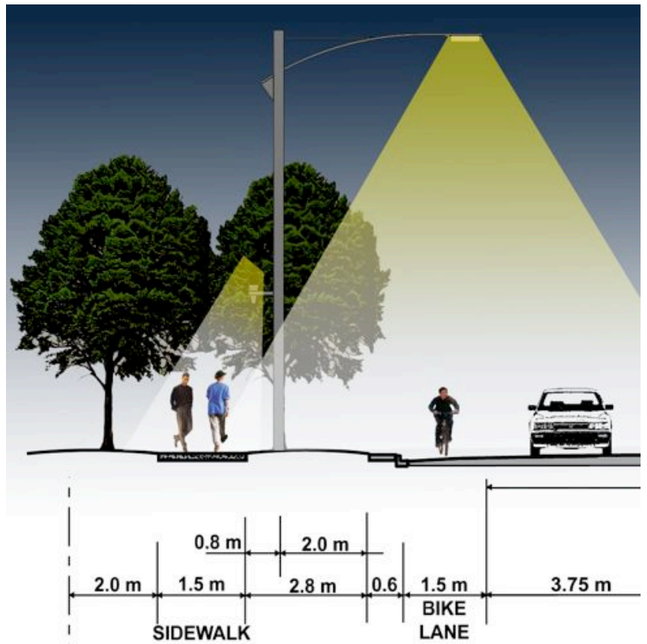


Figure 6.11: Detail of proposed design of Valley Road incorporating both general and pedestrian lighting standards.

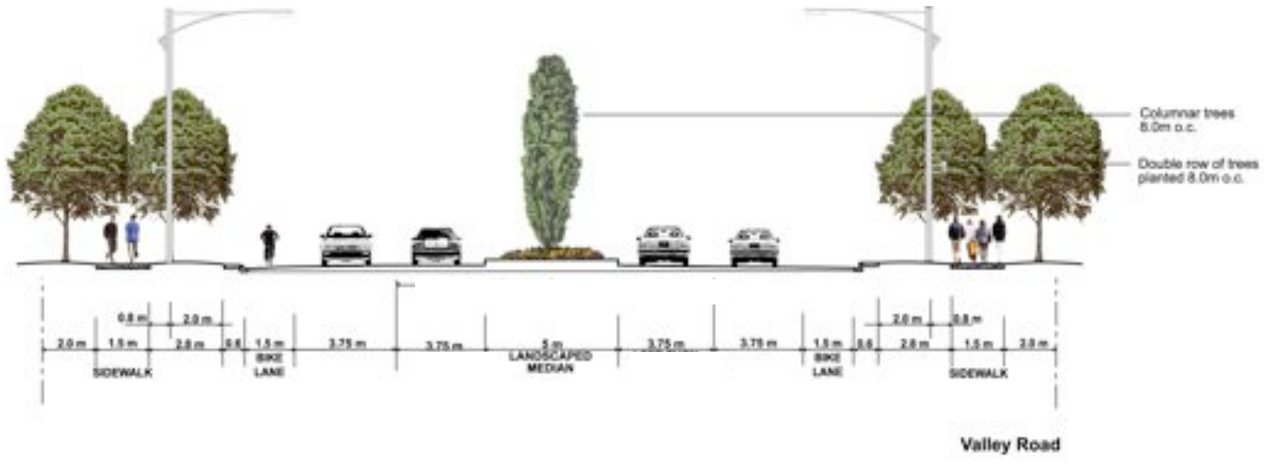


Figure 6.12: Proposed design of Valley Road illustrating landscaped median and tree-lined sidewalks.

6.2.2 Pedestrian Paths

Pedestrian routes and roads should be lined with consistent rows of tree planting wherever possible. Trees should generally provide a high canopy to promote visibility and safety and should be spaced approximately 8.0 metres on centre.

Pedestrian paths and sidewalks should generally be designed as follows: primary campus walkways should be approximately 6.5 metres in width with an additional allowance for the placement of trees and pedestrian lighting on either side of the path; primary sidewalks (flanking building edges) should be 4.0 metres in width and secondary sidewalks 3.0 metres in width with an additional allowance for street trees in tree grates (allow 1.0 metre) or street trees in a boulevard (allow 2.5 metres). Local pathways accommodating lower pedestrian traffic volumes should be a minimum of 1.5 metres in width.

Attractive pedestrian lighting should be provided along all pedestrian paths.

6.2.3 Roads

Major roads into the campus such as Valley Road and Aperture Drive should provide sidewalk separation from the roadway through the use of boulevards a minimum of 2.5 meters in width and incorporating street trees.

Major roads should where possible provide dedicated and marked bicycle lanes (1.5 metres in width) within the roadway.

Pedestrian crossings of roadways should be clearly designated through a combination of treatments including the use of special paving materials, raised crossings, signage and lighting.

Traffic calming at pedestrian crossings should also be encouraged through the narrowing of the roadway curb to curb dimension.

Where roads provide for 4 lanes a centre landscaped median (5 metres minimum width) should be encouraged.

7.0 ENERGY CENTRE AND DISTRIBUTION SYSTEMS

7.1 Summary

The central heating and cooling plant in the existing Energy Centre produces hot and chilled water and distributes them to most of the campus buildings. The existing boilers are nearing the end of their useful life and should be replaced in the next few years. Both chillers in the Energy Centre were replaced in 2000. With the recent construction of the LINC building, the present central heating and cooling plant equipment is near capacity. After the two existing 600hp boilers have been replaced and upgraded to two 1000hp and Chiller #3 has been installed, the Energy Centre could serve an expansion of about 20,000 square metres.

Any further campus expansion will require additional plant capacity for heating and cooling. The present location has limited space available for expansion and is difficult to access. It is located far from the centre of the proposed fully developed campus and the existed distribution systems will soon be at capacity. For these reasons, a second Energy Centre should be constructed near the north edge of the academic campus to accommodate further expansion. This smaller Energy Centre #2 would house new heating and cooling systems. The new systems could then be cross-connected (valves normally closed) to the existing distribution systems for improved reliability and redundancy.

7.2 Existing Conditions

The present Energy Centre, including the heating and cooling plant, was constructed in 1971 on the lowest level of University Hall. The Energy Centre houses the main heating and cooling plant, emergency generators, and cogeneration equipment. This centre is also where the primary distribution of the utility services occurs.

7.2.1 Cooling Systems

The central cooling equipment produces and distributes chilled water to most of the campus buildings, including University Hall, the University Centre for the Arts (UCA), the Library Information Network Centre (LINC), the Physical Education/ Student Union/ Regional Aquatic Centre buildings and Turcotte Hall. The total building area served at present is about 118,000 square metres.

The chilled water is distributed through a chilled water piping system to serve zoned areas of the campus. The chilled water is then used in cooling coils inside air handling units to provide cooling.

The cooling plant uses two Trane 825 ton centrifugal chillers powered by electricity to produce chilled water. Heat is rejected through two Baltimore Air Coil cross-flow cooling towers, installed in 1971 in a recessed well east of University Hall. The original chillers were replaced in 2000. There is room in the plant to add a third chiller, though additional cooling tower capacity will be more difficult to accommodate.

The two chillers are each served by a dedicated constant flow primary pump that delivers chilled water to the secondary system. The variable flow secondary pumps distribute chilled water to the buildings. A single dedicated secondary pump serves University Hall and two secondary pumps in parallel to serve the other buildings on the system. Variable flow tertiary pumps deliver the chilled water to serve each building.

7.2.2 Heating Plant

The central heating equipment produces and distributes heating water to serve almost all of the campus buildings, including University Hall, the University Centre for the Arts, the Library Information Network Centre, the Physical Education/ Student Union/ Regional Aquatic Centre buildings, Turcotte Hall and the student residence buildings. The total building area served at present is about 135,000 square metres.

The heating plant uses three natural gas fire-tube boilers with powered burners to create low temperature hot water. The two 600 hp boilers, installed in 1971, are nearing the end of their serviceable life. The third boiler (250 hp) was installed in 1975. The boiler control system is equipped with outdoor temperature reset capability. In the cold weather, the water temperature is set to 88°C (190°F).

The heating water is distributed through a heating water piping system to serve zoned areas of the campus. The heating water is then used in air handling units, radiation elements, and fan forced heaters to provide heating. Four constant volume pumps serve the boilers. One pump serves University Hall, two serve UCA, LINC and the residences, and the fourth pump serves the remainder of the buildings. Within each building or major mechanical room, tertiary pumps deliver the heating water to serve heating zones. The air handling units are served through water-to-glycol heat exchangers.

7.2.3 Cogeneration

A cogeneration plant was added into the Energy Centre in 1980. The capacity of the cogeneration equipment is about 1 Megawatt. The system uses natural gas energy to create electricity. The waste heat from the system can be used for the heating system. The system was used for peak electrical cost shaving when economically appropriate. The system is currently not used due to electricity and natural gas rates.

7.3 Proposed Development

7.3.1 Existing Hot and Chilled Water Distribution Systems

Based on a report entitled “Central Heating and Cooling Plant - Summary of Existing Capacity” of March 2001 prepared by Wiebe Forest Engineering Ltd., the piping distribution systems have spare but limited reserve capacity. For the chilled water cooling system, there is a reserve capacity of some 700 USgpm. For the heating system, there is a reserve capacity of 1300 USgpm in the UCA/LINC/student residences distribution system, and 385 USgpm in the Physical Education/ Student Union/Turcotte Hall distribution system. These are the limitations on the

capacity of the existing distribution systems. There are also some local space restrictions on the routing of the piping through the basement level, in particular in the vertical connection from the UCA to the LINC. These issues can be addressed under the expansion program but would require remedial measures.

University operating staff is concerned about the longevity of the buried hot water line between University Hall and the Student Union Centre. The lower half of this line is Rickwill pipe, whereas the upper half is direct bury "yellow jacket" pipe. One solution to this would be to install a larger, shallower pipe to replace at least the Rickwill section, which is of greater concern.

7.3.2 Building Energy Conservation

New buildings on the campus should be designed to be as energy efficient as economically feasible. At this time a reasonable goal should be 25% less than the current standard set by the National Energy Code. In our experience this is technically and economically achievable for academic facilities, including those used for teaching and research in scientific programs.

7.3.3 Phase One Development

Prior to the construction of LINC, the University required about 900 hp of boiler capacity at full load. With LINC now occupied, almost the full capacity of the two large boilers will be required, leaving Boiler #3 (250 hp) in reserve.

Ideally, boilers should be sized and configured so that the central plant can maintain, with any one boiler out of service, a comfortable environment on the coldest day of the year. To do so, reasonable measures would have to be taken to minimize load such as shutting down ventilation and removing non-essential loads. The University realizes that it must soon replace the two 600 hp boilers, which have a long history of tube failure. Developments in boiler efficiency will allow the University to increase the capacities of the Boilers #1 and #2 to about 1000 hp each when they are replaced. Clearly, the boilers should be upgraded before the existing Energy Centre serves any further heating load growth. In due course, Boiler #3 should be replaced and upgraded to 400 or 500 hp to create the correct balance of boiler sizes and redundancy within the plant.

With the LINC building now on stream, the two existing chillers are near capacity. Most campuses do not consider space cooling to be essential and, therefore, do not provide the same level of redundancy for chillers as for boilers. That said, the University will have to add the third chiller if any additional space is to be cooled by the Energy Centre.

After replacement of Boilers #1 and #2 and the addition of Chiller #3 and its cooling tower, the first buildings of the proposed campus development plan can be connected to the existing central heating and cooling systems provided the aggregate area is less than about 20,000 square metres. Beyond this stage, a second energy centre would be required. As discussed previously, the limiting factors are space within (and accessibility to) the existing Energy Centre and pipe sizes of the existing hot and chilled water distribution systems.

Phase One development will require extension of the heating and cooling distribution systems from the northwest corner of LINC to the buildings of Phase One expansion.
As discussed below, as much of the new heating and cooling loads as possible should be served by the new energy centre, rather than increasing the loads on the existing Energy Centre and distribution system. This, of course, will depend on timing and funding.

7.3.4 Completion of Phase One and Phase Two Development

With consideration to the prevailing westerly winds and keeping the new Energy Centre #2 within reasonable proximity to the buildings for the distribution of services, the location for Energy Centre #2 would be south of Valley Road near the east end of proposed future development. In choosing the location for this building, the amount of development within close proximity to the east should be minimal.

The new Energy Centre should be built in conjunction with the second phase of development north of the Quad. It would be much smaller than the existing Energy Centre. This would be particularly the case if 20,000 square metres of new building construction are to be connected to the existing Energy Centre, leaving about 45,000 square metres to be served by Energy Centre #2. The distribution of services would be through buildings and underground utility service corridors to allow the piping to be exposed, rather than direct burial. The new heating and cooling distribution system would then be connected to the existing distribution systems to allow further expansion and redundancy.

One strategy worth considering would be to connect some of the new loads to the existing Energy Centre only until Energy Centre #2 and its distribution system have been constructed. At that point the loads could be transferred to the new system.

Energy Centre #2 would have boiler capacity in the order of 500 hp (that is 2 x 250 hp) and chiller capacity of about 600 tons (2 x 300 tons). The cost of the equipment (boilers, chillers, cooling towers, pumps, piping and controls) would be in the order of one million dollars. This includes neither the cost of the building nor the cost of the distribution system. The University may want to consider moving the existing Boiler #3 (as long as its condition warrants it) from the present Energy Centre to Energy Centre #2 when upgrading to 400 to 500 hp as recommended.

7.3.5 Exploration Place

In the context of its remote location from the existing Energy Centre, Exploration Place was conceived as having stand-alone heating and cooling systems in each building. Indeed, the systems of the first building apparently have reserve capacity for double the space that has been constructed. With the proposed new Energy Centre #2 located just across Valley Road from Exploration Place, it may be appropriate to extend central heating and cooling to serve new buildings within Exploration Park. This would involve a difficult crossing of the City of Lethbridge utility easement, which is full of buried utilities, but should not be dismissed out of hand. If Energy Centre #2 were to serve Exploration Place, its heating and cooling load would about double, resulting in better redundancy both internally and cross over to the existing systems.

8.0 BURIED UTILITIES SERVICING CONCEPT

8.1 Natural Gas

The University of Lethbridge is currently serviced by a 100 mm diameter main natural gas feed off the regulator station to the north of the Valley Road. A new 100 mm pipe is proposed to replace the existing 50 mm pipe, as indicated in Figure 8.1, to service the proposed expansion of the area now occupied by the West Parking Lot.

8.2 Sanitary Sewer

Sanitary sewage flows from University buildings drain into the existing sanitary sewer trunk located within the utility corridor to the north of the Valley Road. The capacity of this receiving sewer to accommodate additional flows resulting from the University expansion plan has been confirmed with the City of Lethbridge. Extension of the existing sanitary sewer main and new service connection lines are shown on Figure 8.1.

8.3 Storm Sewer

The University grounds currently drain to three storm sewer outfalls into the Old Man River and two ties into the City's storm sewer trunk located within the utility corridor to the north of the Valley Road. The University and the City of Lethbridge have confirmed that there has been no problem with the existing storm sewer system, which functioned well during a major downpour two years ago.

The City has indicated that there is adequate capacity in the existing storm sewer trunk to handle additional flows. The City has quantity control guidelines that limit the minor system flow to the 5-year storm event. The excess flow above the 5-year storm up to the 100-year storm has to be detained on site. However, the City does not currently have stormwater quality enhancement requirements.

The University of Lethbridge has no current policy for quantity control and quality enhancement of the storm drainage flows prior to discharge. Alberta Environment, however, has interim guidelines for storm drainage water quality enhancement. These guidelines will become mandatory in the near future. We recommend that University of Lethbridge undertake a stormwater management study to address the interim and long-term drainage solution to meet the Alberta Environment Guidelines. Conceptual depiction of quantity/quality ponds in the Exploration Place area are depicted in the site plans and 3-D model views contained in this report.

8.4 Water Mains

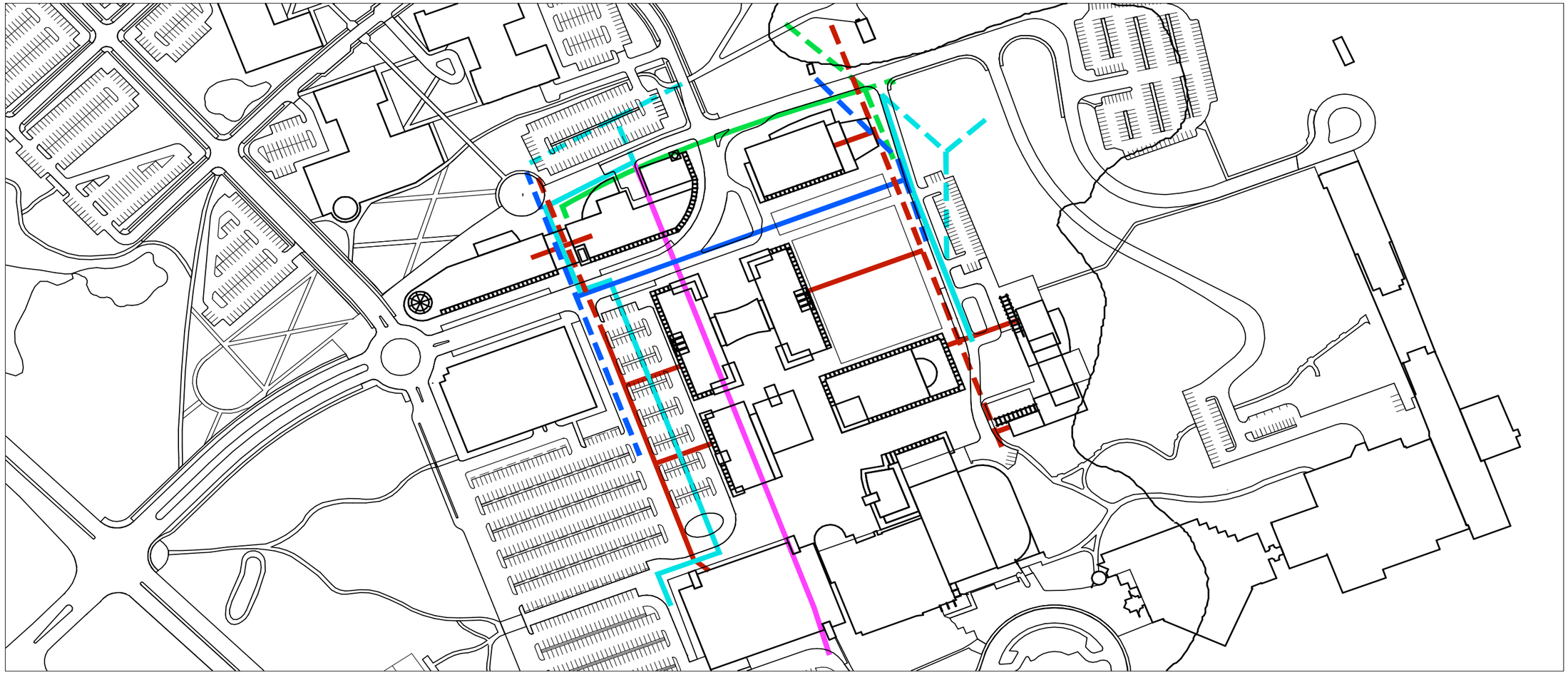
Two water supply lines (north and south) currently service the University, with the north supply line providing the bulk of the water consumed. The City's supply lines are 200 mm in diameter and have adequate pressure. The University's fire fighting mechanism consists of the following features: on-site fire hydrants, sprinkler systems in the building, and siamese connections at the buildings and for fighting coulee fires.

The water is used for domestic consumption, fire fighting, research facilities, and cooling of buildings. A separate system provides non-potable irrigation water throughout the campus. The current potable water demand varies between 10,000 and 18,000 cubic metres per month. Significant water is consumed for research and for cooling. Currently, a hydrant flow test is undertaken before a new building is constructed to confirm if the existing water system is adequate to meet the increased demand.

It is very likely the water main sizing will have to be upgraded when the new energy plant is constructed. A possible water tie for looping purpose is indicated schematically in Figure 8.1.

The requirement for the water tie should be confirmed at the detailed design stage.

We recommend that the University set up a water distribution system model for facility sizing, fire flow analysis, long range planning, pressure zone studies and operation studies.



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9.0 ELECTRIC POWER AND TELEPHONE UTILITY SERVICES

9.1 Electrical System – Existing Conditions

The campus is presently served electrical power from a double ended 15 kV service switchgear located in Electrical Room B4E27 of University Hall.

Two service feeders from the City of Lethbridge electrical utility system substation supply the two ends of the switchgear. A spare feeder cable provides backup to the two live feeders. A tie breaker system allows the campus load to be shared by the two service feeders or to be supplied wholly by either of the feeders.

The switchgear feeds University Hall loads directly and remote loads via a loop distribution system, which is comprised of 15 kV cables run in underground ductbanks to a series of sectionalizing switches located around the campus. These sectionalizing switches allow de-energizing sections of the campus loop without affecting service to other buildings. The total demand load of the existing campus is identified in Magna IV's November 2000 report at about 3.8 MVA. Of this, University Hall consumes about 2.3 MVA of load fed directly from the service switchgear. The present campus loop has a capacity of about 2.5 MVA and supplies a load of about 1.5 MVA. Each utility feeder has capacity to feed about 8.2 MVA of load. Because the two feeders provide 100% redundancy, the system capacity is also 8.2 MVA.

9.2 Electrical System – Future Planning

Magna IV Engineering's 13 November 2000 "High Voltage Power Distribution - Long Term Planning" report outlines a plan for isolation of the two utility feeders. This isolation would be accomplished by installing a second service switchgear remote from the existing switchgear, developing a second distribution loop to supply the research precinct, and installing a switchgear in the south campus area with the potential for a third utility supply. The report was, of course, prepared before the current Academic Precinct Expansion Master Plan and will require some modification for the proposed layout.

With the planned upgrading of the system, the overall system capacity will not increase because the two utility feeders remain at the same capacity as existing. The overall system capacity is therefore about 8.2 MVA with 100% redundancy. With the present load of about 3.8 MVA, there is the capacity for about 4.4 MVA of load growth. The added distribution loop and upgrading of the existing loop will increase the loop capacity to 7.6 MVA of load. With the present loop demand of 1.5 MVA, about 6.1 MVA of electrical load at new building sites can be accommodated on the two loops. Therefore, the distribution loops will be able to accommodate about 1.7 MVA more load than the capacity of one service feeder.

With the use of energy efficient lighting systems, lighting controls and programmed control of non-essential loads, academic buildings can be expected to require less than 32.3 VA/m^2 of electrical demand. With a load growth capacity of 4.4 MVA, about 136,000 square metres of building space can be accommodated on the system. This should be adequate for the building areas identified for both the academic and research precincts, which total about 110,000 square metres.

The following system planning issues require future study:

- Magna IV's report shows the new service switchgear to be located in a future building west of the Physical Education Building, where the new field house is now proposed. The proposed location should be re-evaluated in the light of the current master plan. Another option would be to locate the switchgear at the site of the proposed new Energy Centre.

- The new north-south ductbank, proposed west of Anderson Hall to connect the new switchgear to the utility substation, would have to be revised if the substation is moved to Energy Centre #2. It would be required to bring the academic precinct distribution loop back to the new switchgear. With the switchgear in either location, it will need to be located further to the west in order to avoid the proposed future buildings.

- If the new switchgear is located in Energy Centre #2, the route of the planned tie-connection between the new and existing switchgears would have to be revised and most likely, new ductbanks would have to be constructed.

- The switchgear at the south campus location may not be required with the planned academic precinct development north of the Physical Education Building.

9.3 Communication Systems – Existing Conditions

The main telephone service to the campus is located in University Hall. Service cables from the utility easement enter via the underground ductbank and manhole system. A new sub-distribution centre will be installed in the Students Union Building.

A computer network system (with fibre optic data transmission cables) is in place throughout the academic precinct, the residences and to the Canadian Centre for Behavioural Neurosciences (CCBN) in Exploration Place. It does not appear to extend south of the Aperture Park residential area. Cable television, fire alarm and building management system cabling is also routed throughout the campus.

Distribution of telecommunications and system cables throughout the campus is generally a radial system via the ductbank / manhole system and from building to building via basements and ceiling spaces. Based on a review of the telecommunications ductbank fill charts, it appears

that the ductbank system has adequate space for system growth. This growth capacity is in the fibre optic distribution system and the strategic location of telecommunication centres “intermediate hubs” through-out campus.

9.4 Communication Systems – Future Development

Over the past decade or two there has been a significant increase in the number of telecommunication lines required due to the use of fax machines, modems, and Internet access. With the more recent increase in the use of cellular telephones, networked computers and electronic mail, this trend to more lines may be diminishing. However, there will still be a significant requirement for telecommunication infrastructure in all of the new and future buildings. Additionally, computer network requirements will continue to increase and change.

With the proposed campus development, the main ductbank run from University Hall to the point of service (Manholes #6 to #2) will remain the main distribution backbone. Manholes #2 west to Manhole #10 were upgraded in 2000.

Telecommunication hubs for both data and telephone networks will need to be set-up in Phase One and Two groups of buildings to serve the local areas. Fibre connected switches interconnect these local hubs to the central distribution centre in University Hall.

Also, with the construction of the power distribution ductbank on the west side of the site, a telecommunications ductbank should also be installed.

Access to the cable raceway systems is an important consideration with communications systems due to the rapidly changing technology. Cable trays run within buildings or service corridors is generally the preferred strategy, though ductbank and manhole systems are also acceptable.

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CORE CAMPUS EXPANSION PLAN

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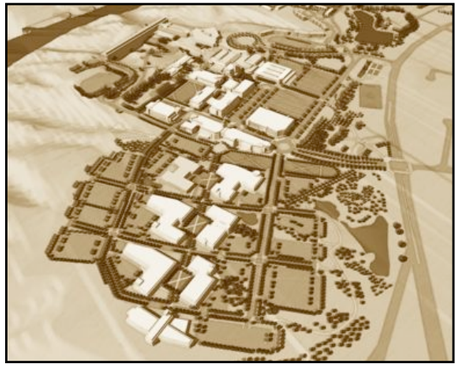

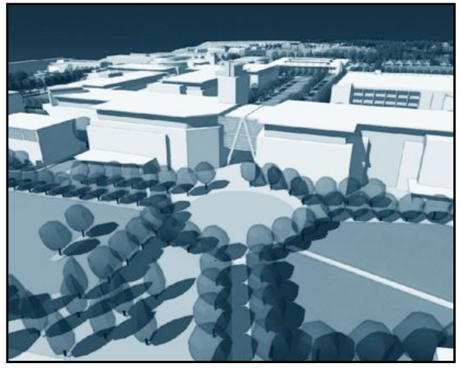

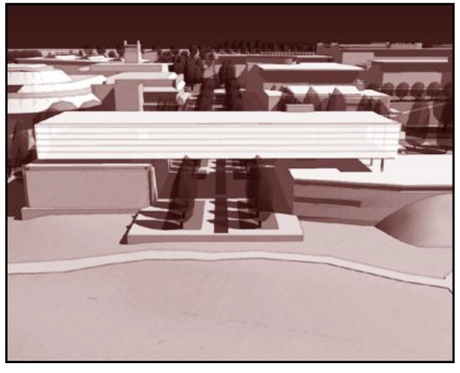

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