GFC Facilities Development Committee (FDC)

Approved Motions

The following Motion and attendant Final Document was approved by the GFC Facilities Development Committee (FDC) at the meeting of March 24, 2011:

Agenda Title: **Physical Activity and Wellness Centre (PAW) – Schematic Design Report**

Motion: THAT the GFC Facilities Development Committee approve, on delegated authority from General Faculties Council, and on the recommendation of Planning and Project Delivery, the proposed Physical Activity and Wellness Centre (PAW) Schematic Design Report as the basis for further design development.

Final Approved Document: Item 4

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OUTLINE OF ISSUE

Agenda Title: **Physical Activity and Wellness Centre (PAW) – Schematic Design Report**

Motion: THAT the GFC Facilities Development Committee approve, on delegated authority from General Faculties Council, and on the recommendation of Planning and Project Delivery, the proposed Physical Activity and Wellness Centre (PAW) Schematic Design Report as the basis for further design development.

Item

Action Requested	☒Approval ☐Recommendation ☐Discussion/Advice ☐Information
Proposed by	Ben Louie, University Architect, Office of the University Architect
Presenter	Ben Louie, University Architect, Office of the University Architect Doug Ramsey, Principal Architect, Group 2 Roy Coulthard, President Graduate Student Association Zach Fentiman, Vice President, Operations and Finance, Student Union
Subject	Physical Activity and Wellness Centre (PAW)- Schematic Design Report

Details

Responsibility	Vice-President (Facilities and Operations)
The Purpose of the Proposal is (please be specific)	To approve the Physical Activity and Wellness Centre – Schematic Design Report which reconciles the delivery of the services and programs as outlined in the approved Functional Master Plan Report.
The Impact of the Proposal is	To build a comprehensive centre for physical activity, wellness, teaching and research on the corner of 114 street and 87 avenue. The project will strengthen access to high quality academic programs; provide social space to enhance student experience as well as health and wellness opportunities to staff, faculty, alumni and the community. The project includes the renewal of existing Physical Education and Recreation facilities which will be integrated with new construction to create an ensemble of a vibrant and innovative consolidated facility.
Replaces/Revises (e.g. policies, resolutions)	N/A
Timeline/Implementation Date	Design development will proceed immediately with the estimated construction timeline as noted below: Phase 1 – January 2012 to January 2014 Phase 2 – January 2014 to January 2015
Estimated Cost	N/A
Sources of Funding	N/A
Notes	A document between the Governors of the University of Alberta and the Students Association/Graduate Students Association entitled the “Physical Activity and Wellness Centre Project Agreement” is being finalized.

Alignment/Compliance

Alignment with Guiding Documents	Dare to Discover, Academic Plan, Capital Plan, Budget, Long Range Development Plan
Compliance with Legislation, Policy and/or Procedure Relevant to the Proposal (please <u>quote</u> legislation and include identifying section numbers)	1. ***Post-Secondary Learning Act* (*PSLA*):** The *PSLA* gives GFC responsibility, subject to the authority of the Board of Governors, over academic affairs (Section 26(1)) and provides that GFC may make recommendations to the Board of Governors on a building program and related matters (Section 26(1) (o)). Section 18(1) of the PSLA give the Board of Governors the authority to make any bylaws “appropriate for the

	management, government and control of the university buildings and land." Section 19 of the *Act* requires that the Board "consider the recommendations of the general faculties council, if any, on matters of academic import prior to providing for (a) the support and maintenance of the university, (b) the betterment of existing buildings, (c) the construction of any new buildings the board considers necessary for the purposes of the university [and] (d) the furnishing and equipping of the existing and newly erected buildings [.] […]" Section 67(1) of the *Act* governs the terms under which university land may be leased. 2. **GFC Facilities Development Committee (FDC) Terms of Reference – Section 3. Mandate of the Committee**: "[…] 2. **Delegation of Authority** Notwithstanding anything to the contrary in the terms of reference above, the Board of Governors and General Faculties Council have delegated to the Facilities Development Committee the following powers and authority: **A. Facilities** 1. To approve proposed General Space Programmes (Programs) for academic units. 2. (i) To approve proposals concerning the design and use of all new facilities and the repurposing of existing facilities and to routinely report these decisions for information to the Board of Governors. (ii) In considering such proposals, GFC FDC may provide advice, upon request, to the Provost and Vice-President (Academic), Vice-President (Facilities and Operations), and/or the University Architect (or their respective delegates) on the siting of such facilities. (GFC SEP 29 2003) **B. Other Matters** The Chair of FDC will bring forward to FDC items where the Office of the Provost and Vice-President (Academic) and/or the Office of the Vice-President (Facilities and Operations), in consultation with other units or officers of the University, is seeking the advice of the Committee." 3. **UAPPOL Space *Management Policy and Space Management Procedure***: The respective roles of GFC FDC and the Vice-President (Facilities and Operations) with regard to institutional space management are set out in this Board-approved Policy and attendant Procedure. To access this policy suite on line, go to: www.uappol.ualberta.ca .

Routing (Include meeting dates)

Consultative Route	• Office of the University Architect

(parties who have seen the proposal and in what capacity)	• Facilities and Operations • Dean of Students and Assistant Dean • Students' Union President, VP, and General Manager • Graduate Students Association President, VP, and General Manager • Dean of the Faculty of Physical Education and Recreation • Associate Dean of Research and AIPAH Executive Director • Acting Executive Director of the Steadward Centre and members of the • Steadward Board of Directors • Director of Operations, Faculty of Physical Education and Recreation and • Coordinator, Capital Development • Visioning Session with students - September, 2009 • Students' Union/Graduate Students Association – Referendum to vote for user fee in support of PAW Centre – March, 2010 • Final Functional Master Plan – presentation to students and all stakeholders, August 27, 2010 • Business Case approved by SIG October 5th, 2010 and by EPC November 3rd , 2010 • Functional Master Plan approved by FDC November 25, 2010 • Open House for Students Union and Graduate Students Association Board members – February 1, 2011
Approval Route (Governance) (including meeting dates)	GFC Facilities Development Committee – March 24, 2011
Final Approver	GFC Facilities Development Committee

Attachments:

1. Link to the Physical Activity and Wellness Centre (PAW) - Schematic Design Report will be provided on March 11, 2011.

Prepared by:

Ben Louie, University Architect,
Office of the University Architect,
Facilities and Operations
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Physical Activity & Wellness (PAW) Centre Schematic Design Report March 24, 2011 – FDC Committee – Report Approval Presentation

Background

Excerpt from the University of Alberta, Senate Task Force Report on Wellness.
Without upgrades and expansion of existing health and wellness facilities, the University of Alberta will not be able to achieve its vision of *Becoming the Healthiest University in Canada – Improving the Overall Wellness of the U of A community.*

The Physical Activity and Wellness (PAW) Centre supports many of the cornerstones in the University of Alberta's Dare to Discover: A Vision for a Great University.

With increased emphasis on health and well-being, a modern fitness centre and related amenities is a competitive advantage in attracting outstanding students. The University is at risk of falling behind other Canadian institutions if it does not invest in athletic and recreational space. The PAW Centre will provide more and better opportunities for students, faculty and staff to maintain healthy lifestyles through exercise and recreation.

The PAW Centre project also facilities the expansion and enhancement of the Faculty of Physical Education and Recreation's teaching, lab and research spaces. It will attract post-doctoral fellows, researchers and visitors from around the world to join in the academic community already in place and better service it's clients.

The Alberta Institute (pending) for Physical Activity and Health (AIPAH) is focused on research and part of the PAW Centre. This group will foster national and international research collaborations that advance understanding and generate knowledge to address global challenges.

As the PAW Centre project includes the relocation and expansion of the Steadward Centre, it will engage, serve and draw strength from the diversity of our external communities as well as increase accessibility for persons with disabilities.

The site for the new Fitness Centre and Climbing Centre at the corner of 87th avenue and 114th street can be described as a "crossroads" between the Health Sciences district and the entry to North Campus. Other site features include significant access for vehicles and mass transit as well as to developed pedestrian linkages and bicycle paths. The PAW Centre complies with the University of Alberta, Sector Plan 5 & 6, Long Range Development Plan. It enjoys a central location with respect to the overall campus and it will provide a striking architectural presence. Few universities in Canada have their Physical Activity and Wellness precincts so strategically placed.

Additional Background

The University of Alberta and the Faculty of Physical Education and Recreation (FPER) began its review of the condition and functional space issues at Van Vliet, Universiade Pavilion and Clare Drake arena as far back as 1998.

The original FPER master plan endorsed by Facilities Development Committee (FDC) in 2005 is called the “Van Vliet Centre Programming Study – A Holistic Vision”. This study developed a long term vision for the facility which would allow development to proceed in an integrated manner allowing for future expansion (for a campus student population of about 45,000 by 2020), while resolving the fundamental challenges and inefficiencies of the existing facility. It proposed to expand the facility on the west side of the existing swimming pool.

Subsequent to this report a number of factors impacted the progress of this original vision including the failed student referendum on a new fitness complex.

The development of major transportation routes and the construction of the Edmonton Clinic Health Academy caused the University to envision a larger academic profile to the complex. In 2007, Johns Group 2 completed the Physical Activity and Health Complex Project Scope Confirmation Report which proposed a new addition to the south of Van Vliet East with direct connections to major transportation routes, the University and Health Sciences LRT station and other related health facilities as well a future tie to an underground pedway that follows the alignment of the LRT tunnel. In addition to a new Fitness Centre, this report accommodated the needs of a research arm of the FPER, the Alberta Institute of Physical Activity and Health, the Steadward Centre and a number of additional student spaces.

In the fall of 2009, the University of Alberta commissioned Group 2 to complete a series of visioning sessions to further the functional programming that had began in 2007. In the context of ongoing aspirations to re-purpose and re-energize the complex into a centre for Health and Wellness, the project was renamed the Physical Activity and Wellness (PAW) Centre.

In January 2010, a functional plan was presented to representatives of the Students Union, the Graduate Student Association and the Dean of Students leading the way to seek support for an addition fee to support the inclusion and construction of student focused areas. With the success of the student referendum in March 2010 to seek student funding for the PAW project, Group 2 was retained to further refine and complete a Functional Master Plan.

This Functional Master Plan (FMP) Report developed a functional program and areas for a facility that includes an interior concourse/social street, climbing centre, fitness centre, student services, the Steadward Centre, AIPAH, and the renewal of such areas as the locker rooms, racquet ball and squash courts. It developed a strong north south social street between the Van Vliet West and East wings which links the Student Union Building to the north and 87th avenue to the south. It provides a circulation backbone and organizing element for circulation and way finding on all levels of the facility. The student focused programs (lounges, commercial spaces, teaching kitchens, multi-purpose rooms, and quiet study space) are organized around and linked to the social street on two levels. The Fitness Centre and Climbing Centre are accommodated in new construction located on the south east corner of 114th street and 87th avenue, south of the east wing and east of the Universiade Pavilion. The Steadward Centre and AIPAH are located in renewed space in Van Vliet East. The FMP Report was used to develop a Business Case that was approved by the Strategic Initiatives Committee (SIG) on October 5, 2010 and by the Executive Planning Committee (EPC) on November 3, 2010 with the FMP Report being approved by FDC on November 25, 2010.

The Schematic Design Report reconciles the program requirements identified within the FMP and balances the need for new and renewed infrastructure. During schematic design it was found that some additional areas of the existing Van Vliet Centre would need to be renewed for decanting FPER program needs dislocated by the PAW Centre. The current area for the design is 15,798 square metres (170,048 square feet).

The Schematic Design Report provides an overview of the process used to establish and validate stakeholder needs. It is a working document and the program will continue to be refined as we progress into and through Design Development.

The PAW Centre is being designed to minimize its carbon footprint and incorporate sustainable design principles within the University context. Capital and operating cost neutral or cost saving solutions will be the goal of the final design.

Issues

- Though the student body has agreed to support the PAW Centre financially, the document between the Governors of the University of Alberta and the Students Union/Graduate Student Association entitled the "Physical Activity and Wellness Centre project Agreement" is being finalized.
- A detailed community consultation process and communication strategy is being developed to identify and receive feedback arising during the design, construction and operation of this development.
- An inventory of the existing vegetation will be conducted in order to determine the viability of relocating any trees or large shrubs that are impacted by the project to other campus locations like Steadward Centre. The row of trees directly to the east of Van Vliet East will remain.

It is proposed to proceed with design development immediately with the estimated construction of Phase 1 to begin in January 2012 and ending in January 2014. Phase 2 will begin in January 2014 with a view to having the whole facility fully operational by January 2015.

Recommendations

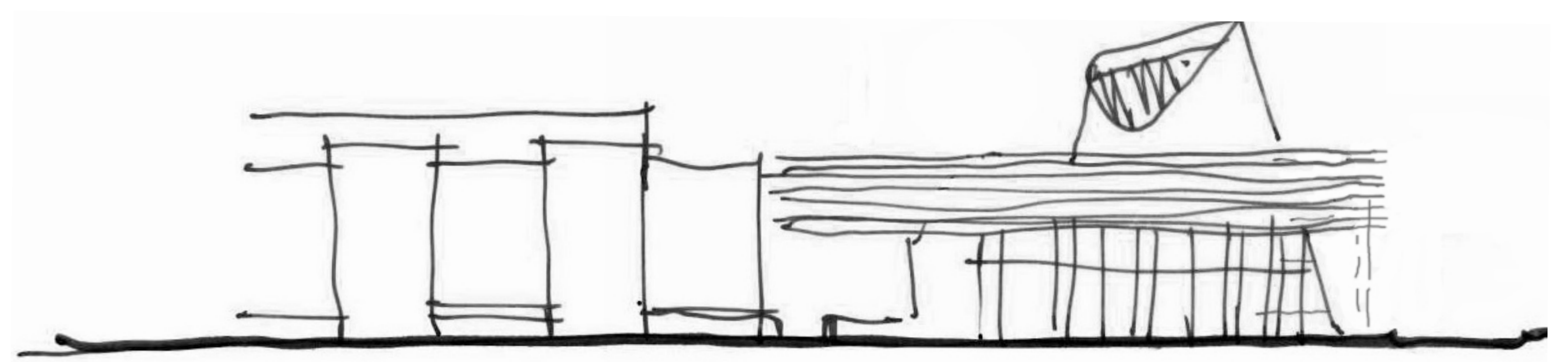
The presentation of the Schematic Design report is provided for approval.

PAW CENTRE

PHYSICAL ACTIVITY & WELLNESS CENTRE

SCHEMATIC DESIGN REPORT

09 091
March 14, 2011



UNIVERSITY OF ALBERTA

Group2 architecture engineering

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

We would like to thank those individuals who contributed to the Schematic Design Report of the Physical Activity and Wellness (PAW) Centre Project.

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Joanna Chan	University of Alberta – GSA
Roy Coulthard	University of Alberta - GSA
Sherrie Blake	University of Alberta – GSA
Ellen Schoeck	University of Alberta – GSA
Nima Yousefi	University of Alberta - GSA
Frank Robinson	University of Alberta – Vice-Provost/Dean of Students
John Barry	University of Alberta - FPER
Dean Budynski	University of Alberta – FPER
Cheryl Harwardt	University of Alberta – FPER
Michael McMahon	University of Alberta – (Former Dean of Physical Education and Recreation)
Edward Montgomery	University of Alberta – FPER
Kerry Mummery	University of Alberta – Dean of Physical Education and Recreation (FPER)
Karen Slater	University of Alberta – The Steadward Centre
John Spence	University of Alberta – AIPAH
John Andrusiak	University of Alberta – Supply Management Services
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Kyle Braithwaite	University of Alberta - Facilities and Operations
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Jeff Kemps	Hemisphere Engineering Inc.
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Mike Shewchuk	AECOM
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Jarett Laramee	Group2 Architecture Engineering Ltd.
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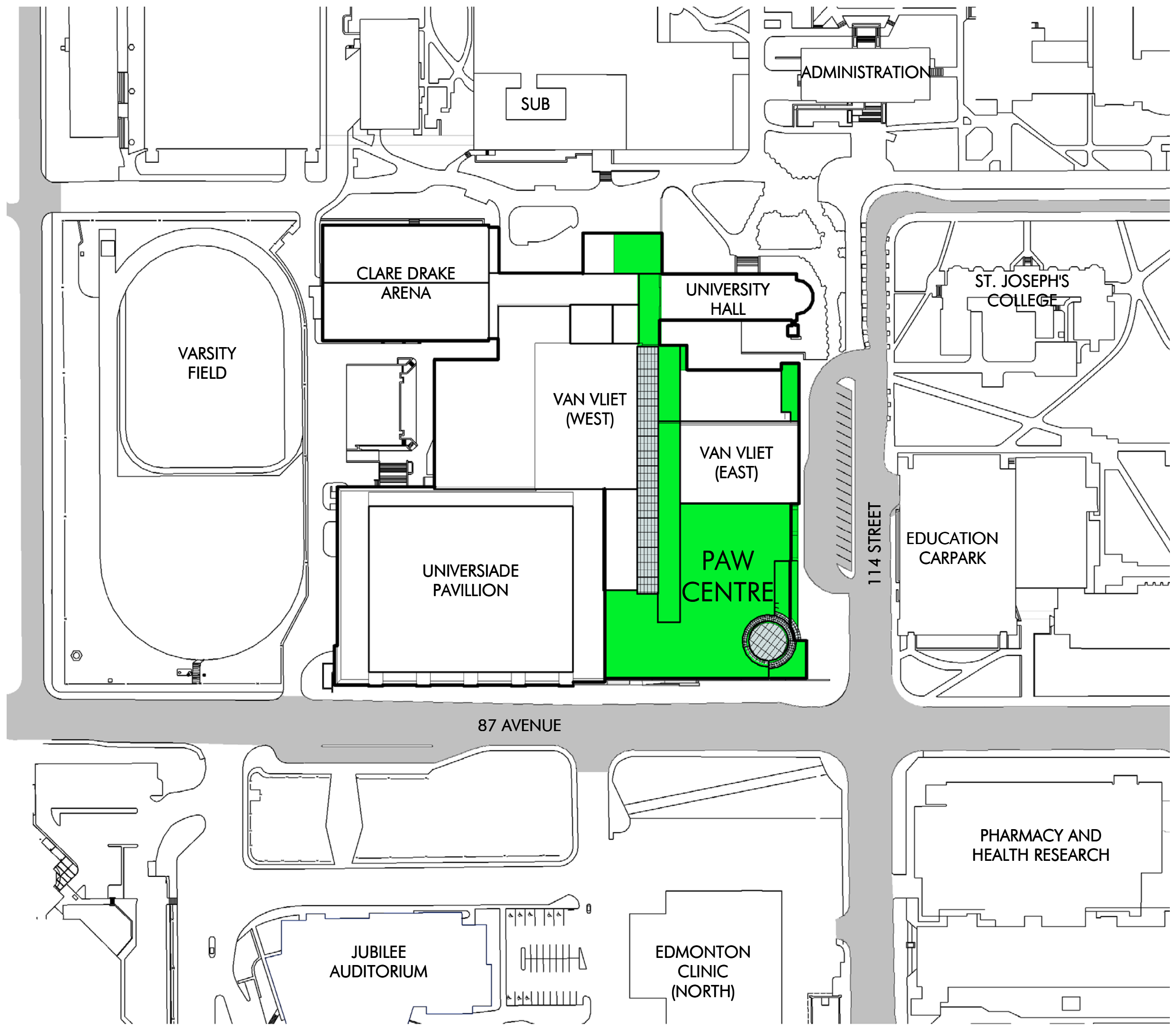
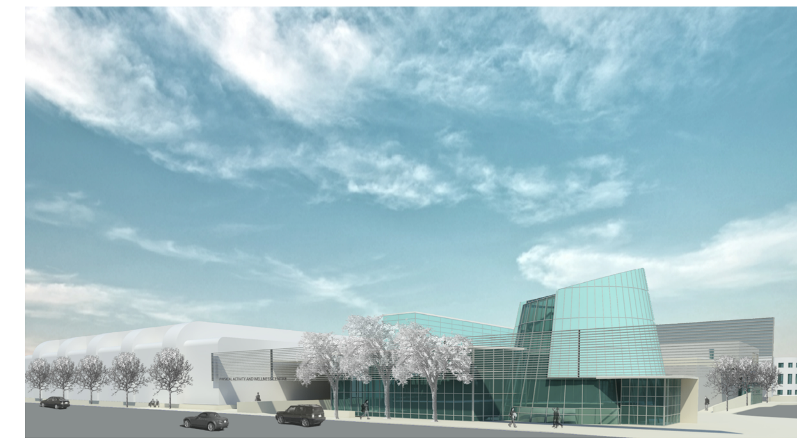
James Reid	Group2 Architecture Engineering Ltd.
Troy Smith	Group2 Architecture Engineering Ltd.



Site Plan



PAW Centre Exterior Rendering

U of A Campus Map - PAW Centre Site

EXECUTIVE SUMMARY

The design and construction of the PAW Centre will fulfill the delivery of services and programs as envisioned by the Functional Master Plan Report dated September 2010. The University of Alberta and the Faculty of Physical Education and Recreation (FPER) first started to review the condition and functional space issues at the Van Vliet Centre (V V C), East Wing, Universiade Pavilion and Clare Drake Arena in 1998. A Masterplan for the Faculty of Physical Education and Recreation entitled The *Van Vliet Centre Programming Study – Holistic Vision* was completed in 2005 by Barry Johns (Architecture) Ltd. (predecessor firm to Group2 Architecture Engineering Ltd.) to identify and present expansion opportunities, particularly with respect to the need for a new expanded fitness centre and ice arena. The study became the touch stone for following studies and reports on the V V C regarding programmatic expansion, circulation and wayfinding. The study developed a long-term vision for the facility to avoid the spectre of adding more space without resolving the fundamental challenges and inefficiencies of the existing facility.

The *Physical Activity and Health Complex (PAHC) Project Scope Confirmation Report* (November 2007) further developed the master plan from 2004. Group2 Architecture Engineering Ltd. (Group2) conducted visioning sessions with representatives of the Fitness Centre, Climbing Centre, The Steadward Centre and Alberta Institute for Physical Activity and Health (AIPAH). The intent was to explore the larger ideas surrounding the need for academic, research and fitness space as an addition to the existing V V C in context with the ongoing aspirations to re-purpose and re-energize the complex into a centre for Health and Wellness. The report included a site analysis which resulted in the recommendation that additional space be added to the south of the East Wing at 87th Avenue. This was a departure from the *Van Vliet Centre Programming Study*, which recommended additional space be added on the west side of the V V C between the Universiade Pavilion and the Clare Drake Arena.

In the fall of 2009, Group2 was requested by the University to build on the PAHC project and develop a functional program. To complement the visioning sessions completed previously, Group2 engaged the students in a Visioning Session regarding an addition to the V V C. To develop the functional program, Group2 re-visited the results of the previous visioning sessions and met with representatives of the Fitness Centre, Climbing Centre, The Steadward Centre and AIPAH. The project was renamed the Physical Activity and Wellness Centre (PAW) Project (presented and approved by Facility Development Committee (FDC) November 25, 2010). Group2 presented a functional program and functional plan to representatives of the Student Union, Graduate Students Association and the Dean of Students in January 2010. This functional plan re-affirmed the PAHC Project proposal to build new space on the site south of the East Wing at 87th Avenue.

With the success of the student referendum to secure student funding to the PAW Project in 2010, Group2 was engaged by the University to confirm and further refine the functional program developed in January and take the project to the end of Design Development. Full architectural, engineering and specialty consulting services are provided by the sub-consulting team including, Stantec, Hemisphere Engineering Inc., AECOM, Williams Engineering Canada, Cuthbert Smith Consulting Partnership Inc. and Larden Muniak Consulting Inc.

The schematic design reconciles the functional program and proposes that existing areas of the V V C, Universiade Pavilion and East Wing be re-purposed and renewed to accommodate such areas as The Steadward Centre and AIPAH. The plan encloses the space between the West (Varsity) Gymnasium and the East Wing through to the North to develop a concourse/social street on Level 2, which make connections from the Student Union Building to the North and 87th Avenue to the south. The new concourse provides a circulation backbone and important social precinct for the new PAW Centre, existing V V C and East Wing. It will act as an organizing element for circulation and wayfinding on all levels of the facility. The Fitness Centre, Climbing Centre and Student Service spaces are all accessed from this concourse on Level 2 and Level 1.

The new Fitness Centre and Climbing Centre specifically, will be new construction. Renewal work is extensive and will be integrated with the new construction to create the overall image of a new consolidated facility. Recognizing the central and high profile location of the site, the new PAW Centre will provide a striking architectural presence at the corner of 87th Avenue and 114 Street. This corner is widely recognized as both a ‘crossroads’ between the Health Sciences District and what will become the new main north entry to the University of Alberta campus, with the future removal of the existing Administration Building and increased exposure of the original campus ‘Quad’.

The current area for the design is 15, 801 square meters (170,080 square feet). If the design gross floor area is reviewed without including the additional renewed space (as these areas are not identified in the Master Plan), the design area is 14,205 square metres (152,905 square feet). The Functional Master Plan program area excluding the area for the squash courts addition to the west is 13,534 square meters (145,679 square feet). The resulting comparable difference between the current design area and the Functional Master Plan program area is 671 square metres (7223 square feet).
A preliminary construction budget estimate has been prepared by an independent cost consultant (Cuthbert Smith) on behalf of the consultant team. The construction budget based on the current schematic design content is estimated to cost $59.6 million ($46.8 million for Hard Costs, $11.9 million for Soft Costs, and 1.65% net GST). This estimate includes 5% design contingency and 10% construction contingency.
The PAW Centre is being designed to minimize its carbon footprint and incorporate sustainable design principles within the University context. Capital and operating cost neutral or cost saving solutions will be the goal in the final design.

This Schematic Design Report is a working document and is being updated through the process of design development as the final scope of work and budget is finalized with the University of Alberta.

1.0 INTRODUCTION

1.1 PROJECT

In 1998, the University of Alberta began to review the facility condition and functional space issues of the Van Vliet Centre (V V C) including the East Wing, Universiade Pavilion and the Clare Drake Arena. An environmental analysis of other Universities in Alberta and across Canada indicates that the University of Alberta has fallen behind other Universities such as Calgary, Saskatchewan, York and Windsor on an area per full-time student for fitness space. The vision to renovate and add to the V V C dovetails with the U of A Senate's wellness initiative, to make the campus the healthiest in Canada.

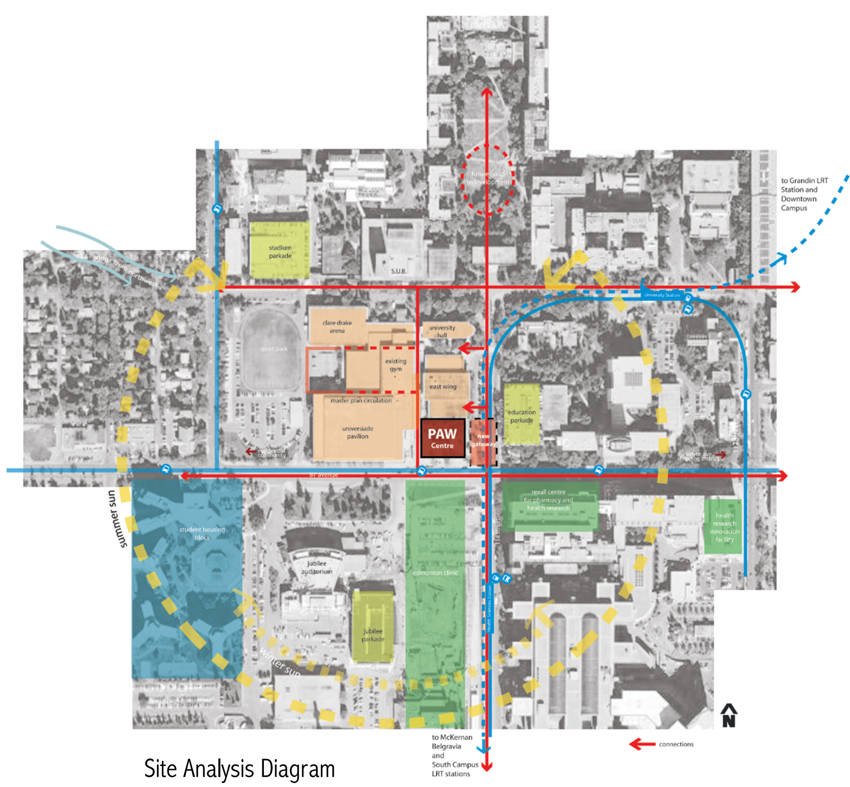
Group2 Architecture Engineering Ltd. (Group2) through its predecessor firm Barry Johns (Architecture) Ltd. (BJAL) began working with the University of Alberta and the Faculty of Physical Education and Recreation (FPER) in 2004 when the firm was engaged to complete a program study for the existing V V C. The purpose of the *Van Vliet Centre Programming Study – Holistic Vision* was to identify and present expansion opportunities (particularly with respect to the Fitness and Arena components) that forecast the expected growth pressures on the facility as the University grows to a full time student body in excess of 45,000 within the next 15 years. The study examined the complex problems of the facility with an integrated approach. Issues of programmatic expansion, circulation, wayfinding and the upgrade of existing services were identified and addressed in the proposed planning. The study developed a long-term vision for the facility which proposed the expansion of the facility on the west side of the existing swimming pool, between the Clare Drake Arena to the north and the Universiade Pavilion to the south.

In 2006, Group2 BJAL/Group2 revisited the previous master plan. The *Physical Activity and Health Complex (PAHC) Project Scope Confirmation Report* (November 6, 2007) proposed a new addition to the existing V V C to address the shortfalls in the quality and quantity of wellness space available to students, staff and faculty. The project proposed a change in direction from that originally contemplated in the initial *Van Vliet Centre Programming Study – Holistic Vision*, approved by FDC in 2005. The construction of the new Edmonton Clinic Health Academy Health Academy, caused FPER and the University to envision a larger academic profile to the complex and its re-purposing, which is consistent with the decision to relocate the majority of the varsity activities to the South Campus over the long term. The concentration of students, faculty, and staff in the Edmonton Clinic Health Academy Health Academy and the Health Care Precinct south of the V V C reinforced the requirement for a direct link for convenient and accessible access to a fitness and wellness facility for clients' integrated treatment and effective health promotion.

The PAHC project proposed to accommodate student and academic spaces including a research arm of the FPER, the Alberta Institute of Physical Activity and Health (AIPAH), The Steadward Centre, the Fitness Centre and the Climbing Complex in a new addition.

AIPAH and The Steadward Centre are considered by the FPER as critical components to any renovation/ addition project. AIPAH is key to the FPER reputation on the U of A Campus as well as internationally. Through its interdisciplinary approach to understanding physical activity and health with particular emphasis on disease prevention, management and health promotion, it attracts research funding, academics and students. The Steadward Centre is also an internationally renowned disability research centre that provides adapted physical activity and sport programs for people (including children) with disabilities.

The PAHC Report recommended the project site for the expansion project be situated to the south of the East Wing. This site departed from the *Van Vliet Centre Programming Study – Holistic Vision* but still enabled the fulfillment of the long term planning goals (Long Range Development Plan, Sector 5 & 6) should PAHC be connected to the rest of the facility by enclosing the outdoor concourse space between the main Gymnasium, the Universiade Pavilion and the East Wing. The Report recommended the construction of the PAHC and the enclosing of a new East Concourse enabling the east section of the original master plan circulation loop to be completed. This would leave the west side of the site – the existing Varsity Field (currently temporarily accommodating parking) and the area beside the west pool open for future development which the university can further consider. The proposed site south of the East Wing would provide the PAHC project with direct connections to major transportation routes, public transit service and other health related facilities such as the Edmonton Clinic Health Academy located just across 87 Avenue.



Site Analysis Diagram

1.2 PROJECT SCOPE & SCHEDULE

Scope

In the fall of 2009 the University commissioned Group2 to complete the visioning sessions and functional programming begun with the PAHC Report. At this point the project name changed from the Physical Activity and Health Centre (PAHC) to the Physical Activity and Wellness Centre (PAW Centre). The functional program concentrated on accommodating the student centered program elements such as a new fitness centre, climbing centre, and renewed locker rooms, squash and racquetball courts, along with the accommodation of The Steadward Centre and AIPAH. The PAW Centre program built on the PAHC Report proposed to construct new space on the south side of the East Wing and construction of a north south concourse between the East Wing and the Competition Gymnasium in the V V C. The PAW Centre Program once again built on the 2005 FPER Master Plan (*Van Vliet Centre Programming Study – Holistic Vision*)considerations for rationalization of circulation and wayfinding.

In September 2010 Group2 completed the Functional Master Plan Report to facilitate confirmation of program areas, estimated construction costs and the completion of the Business Case. The Business Case was approved by the Strategic Initiatives Committee (SIG) on October 5, 2010 and by the Executive Planning Committee (EPC) November 3, 2010. The Functional Master Plan Report was approved by the Facility Development Committee (FDC) on November 25, 2010.

Experiential Collage of Enclosed Concourse

The students and FPER developed the following objectives for the PAW Centre Project:

- Improve fitness facilities and equipment to a level consistent with other major Canadian universities
- Increase available Physical Activity and Wellness space to better accommodate pilates/yoga/aerobics/dance/individual workouts/fitness consultation etc.
- Provide student multipurpose rooms, games room, social space and study spaces
- Move and expand the climbing wall, which in turn will free up space in the Universiade Pavilion for other recreational activities
- Maintain existing gymnasium space for teaching, intramural and recreational uses
- Relocate/renovate existing squash and racquet ball courts
- Renovate the men's and women's locker rooms so that patrons do not have to cross the main circulation route to access the east and west pools
- Provide solutions for the significant long-standing problems of the V V C, especially related to circulation and way finding
- Develop a glazed concourse/social street to establish a strong north south circulation backbone for the PAW Centre, which has prominent entrances on the north side across from the Students Union Building, and on the south at 87th Avenue
- Provide opportunities in the social street/concourse for socialization, food and retail spaces
- Improve accessibility for persons with disabilities
- Enhance the ability of The Steadward Centre to broaden its scope of traditional fitness, health and lifestyle programs to include new and additional programs for its members' and research needs
- Improve research space and facilities for staff and students of AIPAH
- Provide greater visibility and access to The Steadward Centre and AIPAH
- Provide additional employment for University students to work in the new facilities
- Address some of the deferred maintenance liability of the V V C
- Improve operational efficiency through sustainable design that strives to meet LEED® standards for certification
- Improve recruitment and retention of both undergraduate and graduate students, academics, staff and research funding

The Functional Master Plan confirmed and developed a functional program and areas for a facility that includes an interior concourse/social street, climbing centre, fitness centre, student services, the Steadward Centre, AIPAH, and the renewal of such areas as the locker rooms, racquet ball and squash courts. The Functional Master Plan developed a strong north south concourse or social street between the V V C and the East Wing which links the Student Union Building to the north and 87th Avenue to the south. The student focused program (lounges, commercial spaces, multi-purpose rooms, and quiet study space) is organized around and linked to the social street on two levels. The fitness centre and climbing wall are accommodated in new space located on the south east corner of 114th Street and 87th Avenue, south of the East Wing and east of the Universiade Pavilion. The Steadward Centre and the AIPAH are located in renewed space in the East Wing.

The site for the PAW Centre is a prominent site on the University of Alberta Campus as it acts as a gateway into the campus from the Health Care Precinct to the south. The site planning for the project is respectful of the planned development of the Quad (University of Alberta, Long Range Development Plan - Sector Plans 5 & 6).

Schedule

The project schedule outlines that the schematic design report will be submitted by March 1, 2011 and presented to the Facility Development Committee at the March 24, 2011 meeting, with design development continuing until August 2011. Detailed design is scheduled from August until the end of December 2011, with bidding and award of contract scheduled in January 2012. Construction is expected to begin immediately after that, with completion of the two phases in 2015.

Bi-weekly consultant team meetings began November 25, 2010 to develop sustainability strategies and building system options.

1.3 DESIGN PROCESS

A design team was established at the beginning of the project that includes representatives from the Students Union (SU), the Graduate Students Association (GSA), the Faculty of Physical Education and Recreation (FPER), Alberta Institute for Physical Activity and Health (AIPAH), the Steadward Centre (SC), the Office of the University Architect (OUA), Facilities and Operations Project Management Office (PMO), the Prime Consultant and Sub-Consultant Teams. The Team Members include:

Student Union
- Nick Dehod, President of the Student Union
- Zach Fentiman, Vice President Finance of the Student Union
- Marc Dumouchel, Executive Director, Student Union

Graduate Student Association
- Roy Coulthard, President of the Graduate Student Association
- Nima Yousefi, Vice President of the Graduate Student Association
- Sherri Blake, Financial Manager, Graduate Students Association

Faculty of Physical Education and Recreation
- Dr. Kerry Mummery, Dean, Faculty of Physical Education and Recreation
- John Barry, Project Coordinator, Faculty of Physical Education and Recreation
- Dr. Edward Montgomery, Director Operations, Physical Education Operations

Alberta Institute for Physical Activity and Health
- John Spence, Alberta Institute for Physical Activity and Health

The Steadward Centre
- Karen Slater, Executive Director, The Steadward Centre

Office of the University Architect
- Ben Louie, University Architect, Office of the University Architect
- Lorrina Belland, Planner, Office of the University Architect
- Joylyn Teskey, Architect, Office of the University Architect

Facilities and Operations, Project Management Office
- Kyle Braithwaite, Project Manager, Project Management Office

Prime Consultant
- Douglas Ramsey, Group2 Architecture Engineering Ltd.
- Barry Johns, Group2 Architecture Engineering Ltd.
- Nicole Howard, Group2 Architecture Engineering Ltd.
- Janice Kong, Group2 Architecture Engineering Ltd.

Sub-Consultants

- Cameron Franchuk, Structural, Stantec
- Reggie Nicolas, Mechanical, Hemisphere Engineering
- Mike Shewchuk, Electrical, AECOM
- Christine Anderson, Electrical, AECOM
- Kevin Mattai, Electrical, AECOM
- Channing McRae, Civil, Williams Engineering Canada
- Louis Pereira, Landscape Design, Thirdstone Inc.
- Kim Karn, Code Consultant, Larden Muniak Consulting Inc.
- Chris Holden, Costing, Cuthbert Smith Consulting Partnership

The design team began meeting bi-weekly in October 2010. At the first design team meeting the project stakeholders reconfirmed the projects top priorities including:

- Providing a world class facility that the Students and Faculty can be proud of
- The project should have a more encompassing view of wellness that includes non-traditional sports and spiritual well being
- A facility that values health, wellness and sustainability
- The facility should be barrier free
- The project is to be student focused and student driven
- Maximizing the opportunities for social space
- The Fitness and Climbing Centre are to be a key element of the project
- Sustainability is seen as an important factor in promoting health and wellness
- Sustainability should be reflected in the building materials, systems and operations
- Multi purpose spaces are key to the student program
- Quiet areas for study and contemplation
- Commercial spaces with healthy food options and a teaching kitchen for cooking demonstrations and nutrition
- Fitness centre that can accommodate the current student and staff population as well as future
- The fitness centre needs to be bright and exciting with natural light and views out
- The structural design of the climbing wall should take into consideration future expansion of the height of the wall
- The Steadward Centre needs to be easily accessible to their clients and care givers and have a street address
- Have work out areas that are private and safe, and opportunities for integration with able bodied athletes and students
- The PAW Centre will provide the AIPAH with an address on campus
- AIPAH needs to accommodate dry lab space and research space for faculty, visiting researchers, doctoral students and graduate students
- The project should provide a Wall/Hall of Fame to celebrate the Faculty's achievements and the individual achievements of its graduates
- It is critical that the design takes into account the future operations and maintenance of the building
- The phasing of the project needs to be carefully planned to limit the impact on the Faculty and students who work and learn in the V V C, East Wing and Universiade Pavilion
- Locker room renovation is a priority

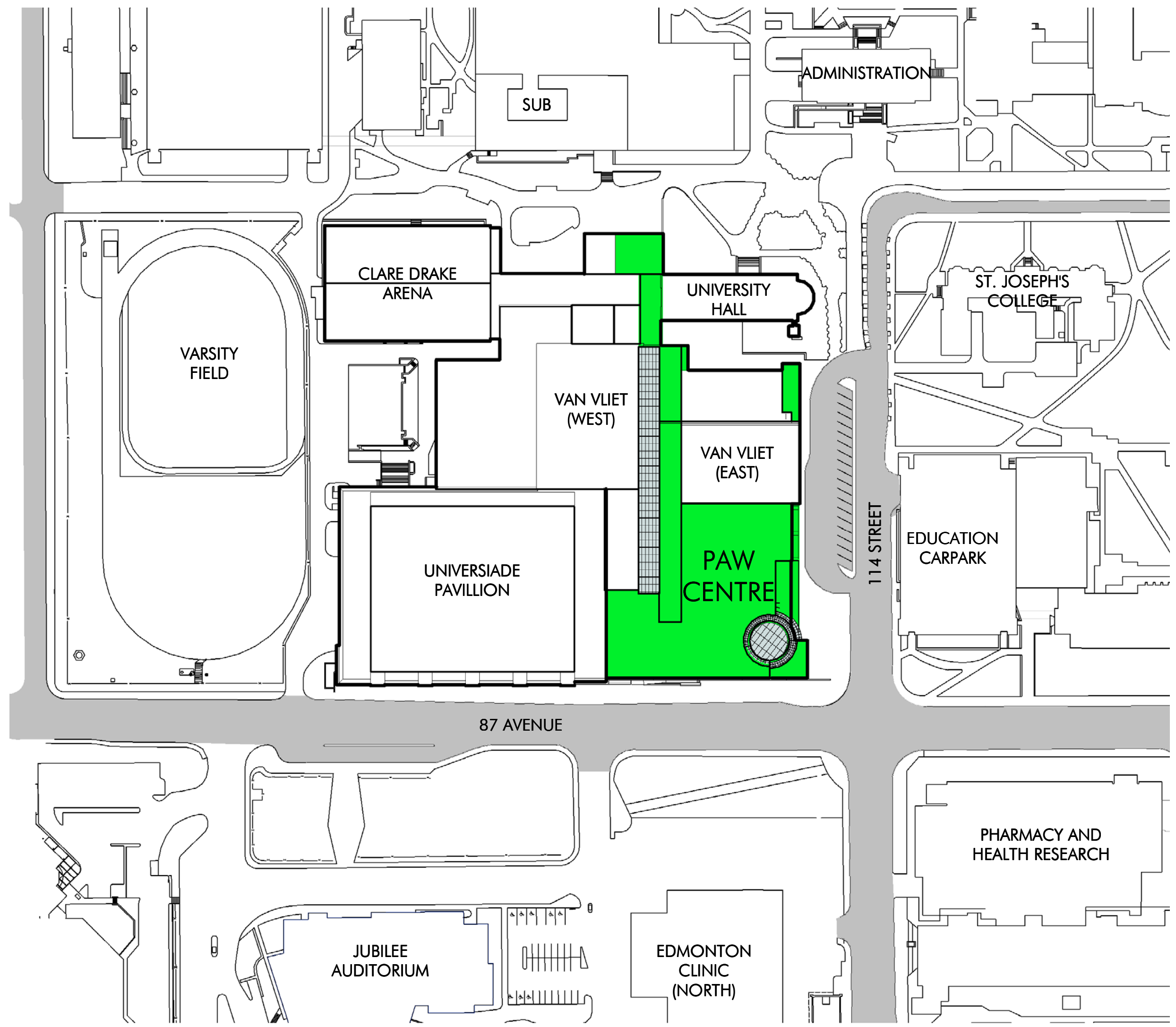
The discussion on priorities was concluded by the University Architect. The project can be viewed as the investment which is made up of the following qualities:

- Engagement and sense of ownership – for all the members of the community
- Inclusive – of all the members of the community
- Balance – all aspects of the Investment
- Process – needing to stay focused
- Accountability – to all users

The outcome of this Investment will be a place that considers functionality, operations and budget. The design needs to be responsive, adaptable and flexible; a place where people will come together and go back to again and again.

The initial design meeting on October 5, 2010 also included a discussion with regard to the significance of the site for the PAW Centre located at the corner of 114th Street and 87th Avenue. It was agreed that the site acts as an entrance to the campus from the Health Precinct to the south. The site was also discussed regarding the larger context of its relationship to the Jubilee Auditorium, Edmonton Clinic Health Academy North, Lister Hall and the redevelopment of the Quad and the proposed future demolition of the Administration Building, and the overall campus. The design team concluded that the site should be respectful of the Quad development and the PAW Building's role to define the ceremonial promenade/boulevard leading to the Quad. The team also agreed that the design needs to take into consideration a future underground link from the Edmonton Clinic Health Academy.

The objectives and conclusions from the Functional Master Plan Report, and the priorities and design goals of the design team have been incorporated into the current design of the PAW Centre.



Site Plan

U of A Campus Map - PAW Centre Site

2.0 SCHEMATIC DESIGN

'The intent is to design a unified health and fitness complex- a focal point - that integrates disparate parts of the existing buildings with a clear circulation order as well as improved security and control'

…Van Vliet Centre Programming Study – A Holistic Vision

The basic planning principles around the PAW project take several important factors into consideration.

For the students:

A new Fitness Centre, Climbing Centre, and Student Services facilities that are high profile and suited to their current and long term needs.

For the Faculty:

This represents an opportunity to work within a overall planning context, increase efficiency and improve wayfinding in a building that has been developed overtime with a number of additions and renovations

For the University:

The overall Long Range Development Plan for the campus should be strengthened by this project which is located in the central zone of the north campus, on a strategic and high profile site.

2.1 SITE AND BUILDING PLANNING OBJECTIVES

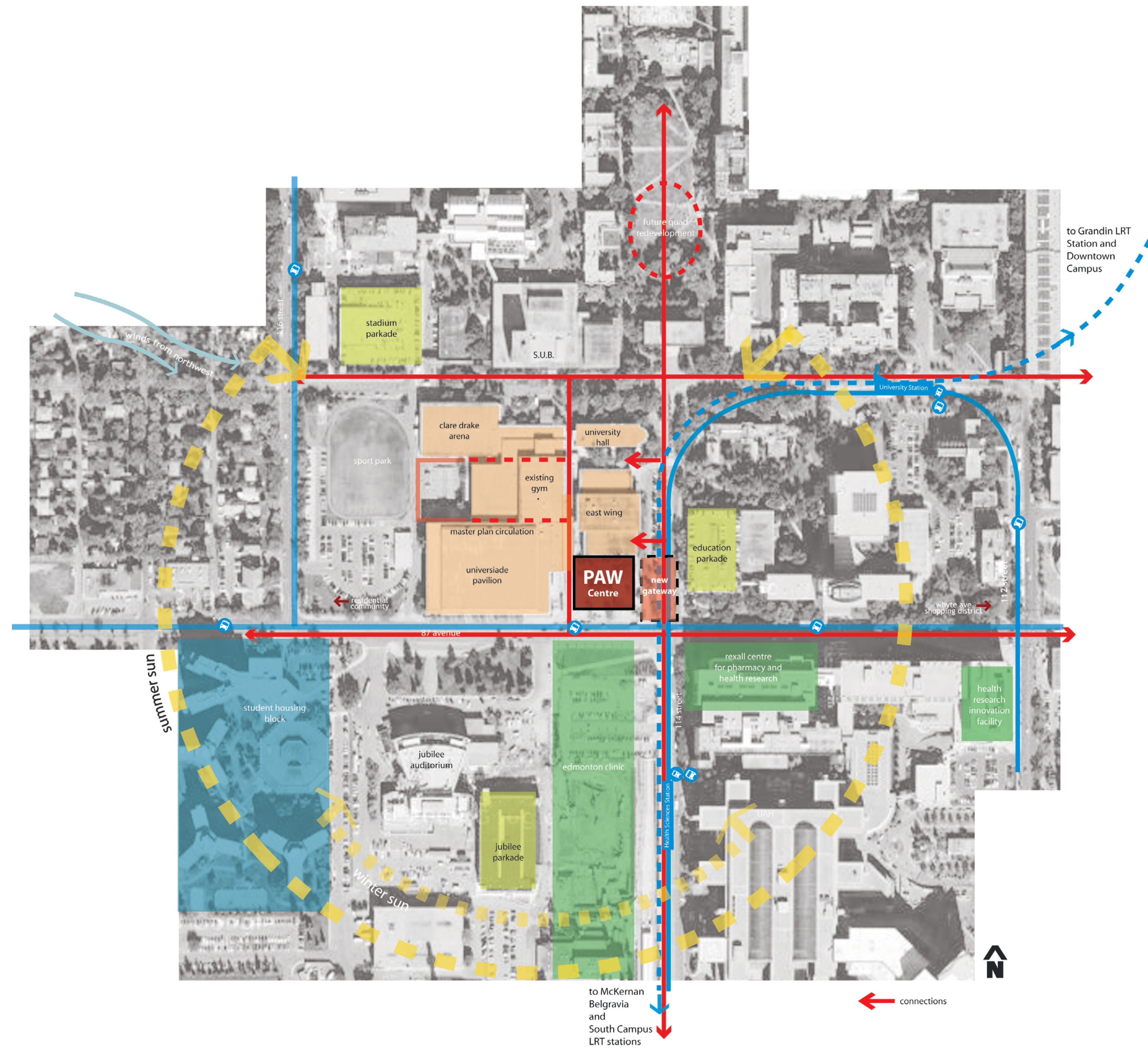
The Report entitled *Van Vliet Centre Programming Study – A Holistic* Vision prepared by Barry Johns (Architecture) Limited in January 2005 presented an overall planning strategy for the existing Van Vliet Physical Education and Recreation Centre in response to the University of Alberta Long Range Development Plan Sector, Plans 5 & 6 that stands today as the baseline analysis of the existing physical activity complex, and provides the conceptual framework for the new PAW Centre. Endorsed by Facilities Development Committee (FDC), the original Report sets out a number of strategic site planning initiatives that remain priority items and are summarized as follows:

1. To develop the project in an integrated manner allowing for future expansion while resolving current site circulation and internal control/ wayfinding issues.
2. To reaffirm the location of the facility as a focal point at the new major 'entry' axis of the north campus for activity and social networking.
3. To position the new Fitness Centre at the heart of this activity area.
4. To create new opportunities for enhancement of the existing site and adjacent buildings.

The PAW presentation in January 2010 and the Functional Master Plan Report in September 2010 continues this quest and the refined program in this schematic design phase also complies with the spirit of the current planning for the 114th Street Entry Axis to the campus (*University of Alberta, Long Range Development Plan, Sector Plans 5 & 6*).

Concourse to be Enclosed

Building Exterior - North Entry



Site Analysis Diagram

2.2 SITE ANALYSIS

The site for the new Fitness Centre and Climbing Centre at the corner of 87th Avenue and 114 Street can be described as a 'crossroads' between the Health Sciences District and the entry to the North Campus. The new Edmonton Clinic (North) immediately to the south of the site forms a new 'street wall' that begins to frame the view corridor along 114th Street to the original campus 'Quad', a courtyard and green space that will become visible with the future removal of the existing Administration Building. The reaffirmation of this Quad as a central north south open space identifies the 114 Street axis as the entry gateway to the campus and the new fitness facility will be highly exposed along this major path.

As such, the site of the entire PAW Centre enjoys a central location with respect to the overall campus plan. Few universities in Canada have their Physical Activity and Wellness precincts so strategically located.

Careful consideration is given as to how the facility addresses this major intersection and entry point to the campus. The building design and edge condition takes into consideration the human scale of the facility adjacent to a pedestrian and vehicular circulation route and meeting point, while recognizing the facilities urban context. The facility and corner plaza defines this major entrance to the campus.

Many other site features impact this positive context:

- Significant access for vehicles and mass transit - The Education, Stadium and Jubilee parkades are within easy walking distance from each direction, the University and Health Sciences LRT stations are each close by and the primary bus loop and transit stop flanks both the northeast corner of the site and also serves 87th Avenue directly in front of the complex.
- Significant developed pedestrian linkages - The main east west campus pedestrian thoroughfare stretches across the north face of the complex from Garneau to Windsor Park with the Student Union Building immediately across this path, defining the 'front door' to the complex (although the facility is accessible from all directions). A major crosswalk connects the south of the building to the Jubilee site and the south west sector of student housing.
- Other links - Bicycle paths and natural pedestrian networks in various areas on campus also converge towards the site.

There are as a result, numerous opportunities that can be exploited in the design of the new facility and these include:

- Creating a linear circulation link including an underground connection between the Edmonton Clinic Health Academy and the new PAW Centre. This link follows the alignment of the LRT tunnel. This enables future connections between the buildings, related programs and convenient access for students and staff using the fitness facilities
- Taking advantage of sunlight and good orientation
- Improving access to the west open green activity space or future recreational playing fields
- Careful redevelopment of entrances to enhance wayfinding and circulation.

An inventory of the existing vegetation will be conducted in order to determine the viability of relocating any trees or large shrubs that are impacted by the project. The row of trees directly to the east of the East Building will remain.

Panoramic View of Site looking North


Courtyard between University Hall & East Wing

Councourse to be Enclosed


Site for New Fitness Centre & Climbing Wall


North Entrance (University Hall Connection)


Existing Van Vliet Centre Entrance


Existing University Hall Connection

2.3 ARCHITECTURAL DESIGN

2.3.1 Qualities Of Space

The overall development is infused with natural light. This is a structured theme in the development of the entire fitness area and the public concourse. Daylight serves as an effective cognitive mechanism - when view lines in corridors terminate on natural light, it becomes easy to determine one's location and navigation through unfamiliar areas is made more clear. Further, the use of sunshine is also a major attraction to the facility, particularly when the days are short in winter. Sunshine is essential for health and well being, and stimulates all the sensory systems. These characteristics overarch all design decisions and the placement of all components in the plan are driven by proximity to and suitability to either daylight or sunshine.

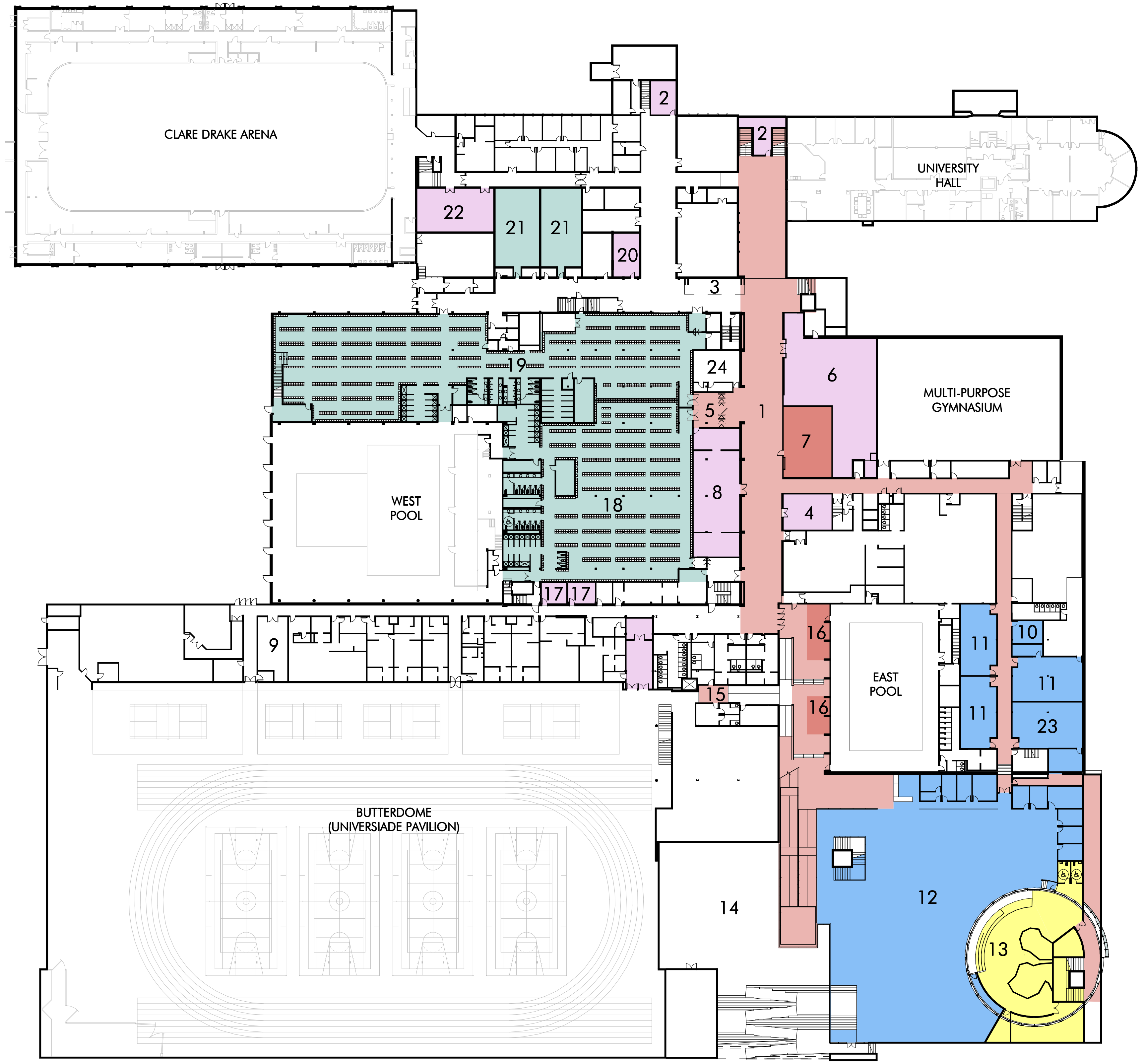
This is particularly true in the Fitness Centre and Climbing Centre components of the program. Located at the south east corner of the site, the opportunity exists to bring in daylight and controlled sunshine to this large area and in so doing maximize the transparency of this part of the complex so the entry to the campus along 114th Street is visually active. Students, visitors and passersby are each fully aware of the activity and vibrancy of the life within its walls.

Thus the architecture is intended to be open, with high volumes, airy, welcoming, dynamic, highly visible and a suitable landmark at the entrance to the campus, consistent with that contemplated in the *Building on Vision* document.

The intent is to ensure that barrier free accessibility is afforded to all areas of the complex. Universal design principals will be implemented including, but not limited to, door width and turning radii, special consideration for washrooms, signage for persons with visual impairments, non-fixed benched in locker room, modified locker heights. Given the need to accommodate The Steadward Centre in a new, expanded location, this alone demands a revitalized plan that maximizes the use of ramps and minimizes the need for elevators to provide gracious and dignified circulation to all components of the program and all areas of the site.

Creature comfort in any intensively used athletics facility must also be predicated on excellent air quality and temperature control to ensure that spaces remain fresh and environmentally clean, regardless of their use. Mechanical systems are to be reviewed to provide greater efficiency with both passive and active strategies to meet LEED™ design and performance criteria while minimizing the project's carbon footprint (refer to 3.0 Sustainable Design strategies).

2.3.2 Floor Plans, Elevations and Building Sections



FLOOR PLAN

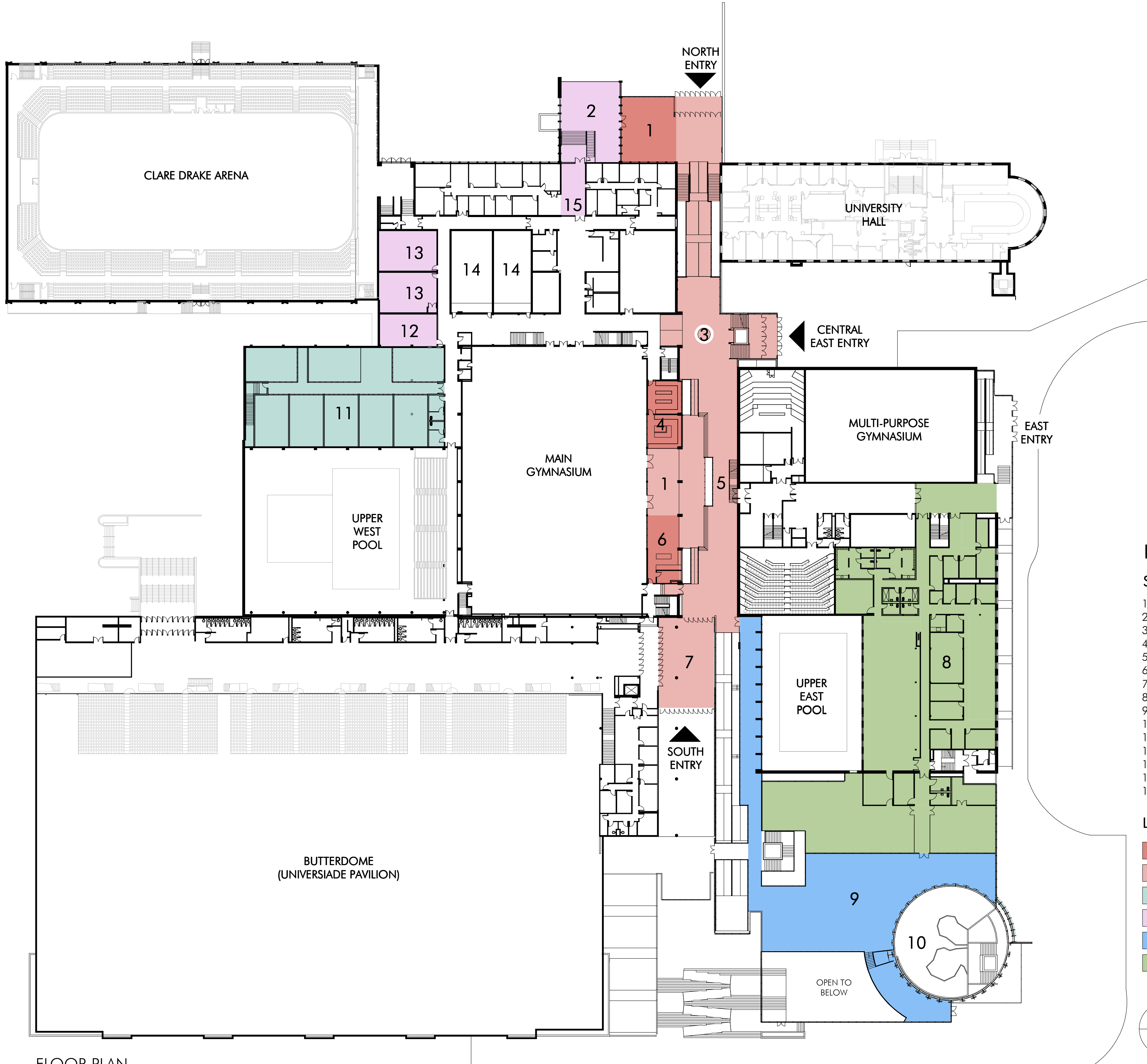
LEVEL 1

SPACE LEGEND

1 LOWER CONCOURSE
2 BUILDING SERVICES STORAGE
3 EXISTING BOOSTER JUICE
4 INTRAMURAL PROGRAM OFFICE - REGISTRATION / INFO
5 LOCKER AREAS ENTRANCE
6 SPORT DEVELOPMENT CENTRE, ATHLETE HEALTH PROGRAM AND ATHLETIC THERAPY
7 ACTIVITY REGISTRATION ZONE, STUDENT/FACULTY PRO SHOP
8 EQUIPMENT ROOM/DISPENSING/STAFF AREA
9 RELOCATED STORAGE
10 MEETING ROOM
11 STUDIO
12 FITNESS CENTRE
13 CLIMBING CENTRE
14 LOWER PLAZA
15 NEW BUTTERDOME EAST ENTRANCE
16 GAMES AREA
17 FAMILY CHANGEROOMS
18 WOMEN'S LOCKER ROOM
19 MEN'S LOCKER ROOM
20 MEETING ROOM
21 RACQUETBALL COURT
22 VARSITY TRAINING ROOM
23 SPIN CYCLE STUDIO
24 MINERVA ROOM (UNCHANGED)

LEGEND

STUDENT SERVICES
CONCOURSE
RENEWED
RENEWED - ADDITIONAL
CLIMBING CENTRE
FITNESS AREA



FLOOR PLAN

LEVEL 2

SPACE LEGEND

1 STUDENT LOUNGE
2 HALL OF FAME
3 INFORMATION CENTRE
4 RETAIL SPACE SERVICE AREA
5 MAIN CONCOURSE (SOCIAL STREET)
6 COMMUNITY / TEACHING KITCHEN
7 NEW VESTIBULE
8 STEADWARD CENTRE
9 FITNESS CENTRE MEZZANINE
10 UPPER CLIMBING CENTRE
11 SQUASH COURTS
12 MEETING ROOM
13 CLASSROOM / LAB
14 UPPER RACQUETBALL COURTS
15 PHYS. ED. FACULTY RECEPTION

LEGEND

- STUDENT SERVICES
- CONCOURSE
- RENEWED
- RENEWED - ADDITIONAL
- FITNESS AREA
- STEADWARD CENTRE

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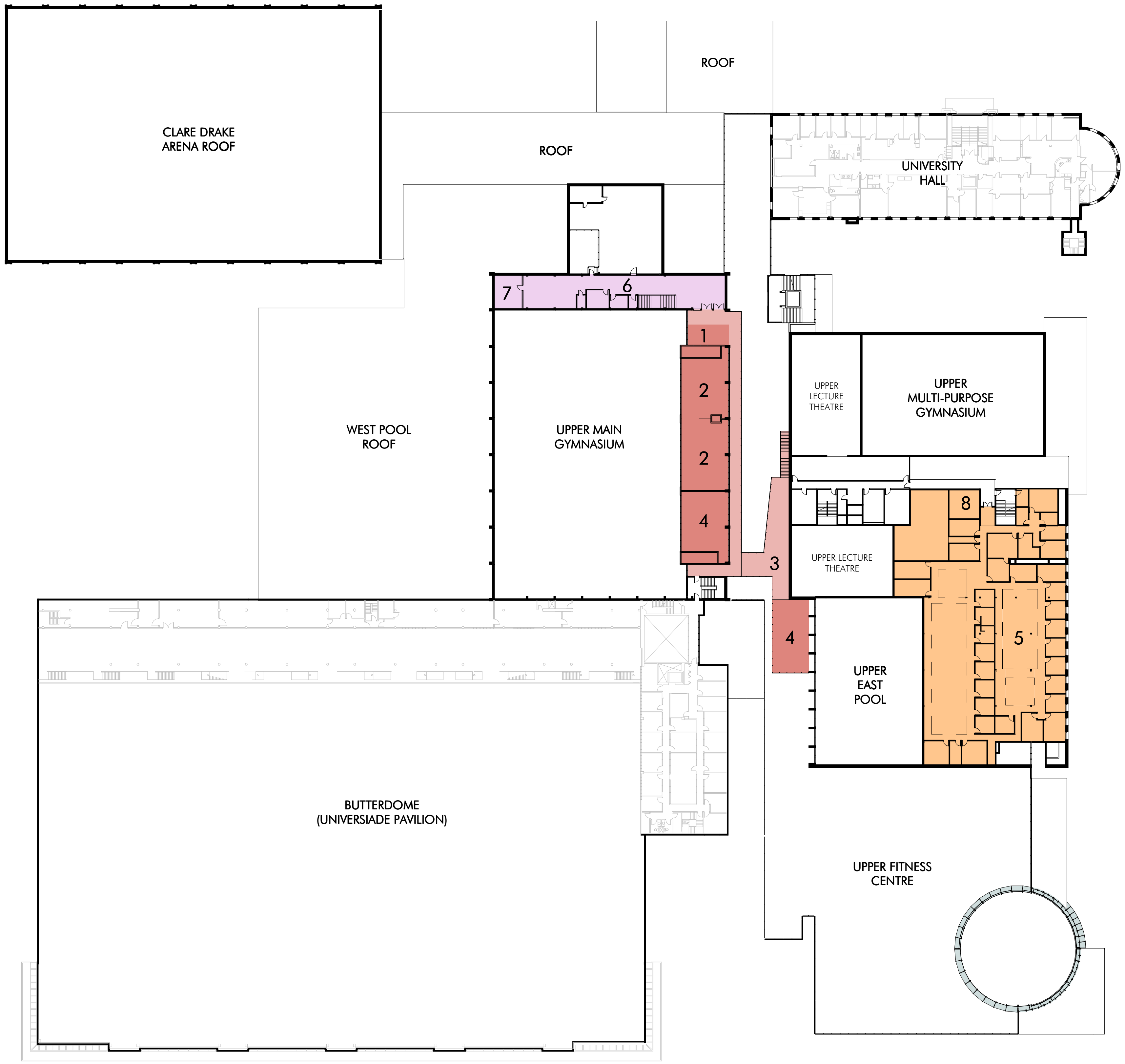


FLOOR PLAN

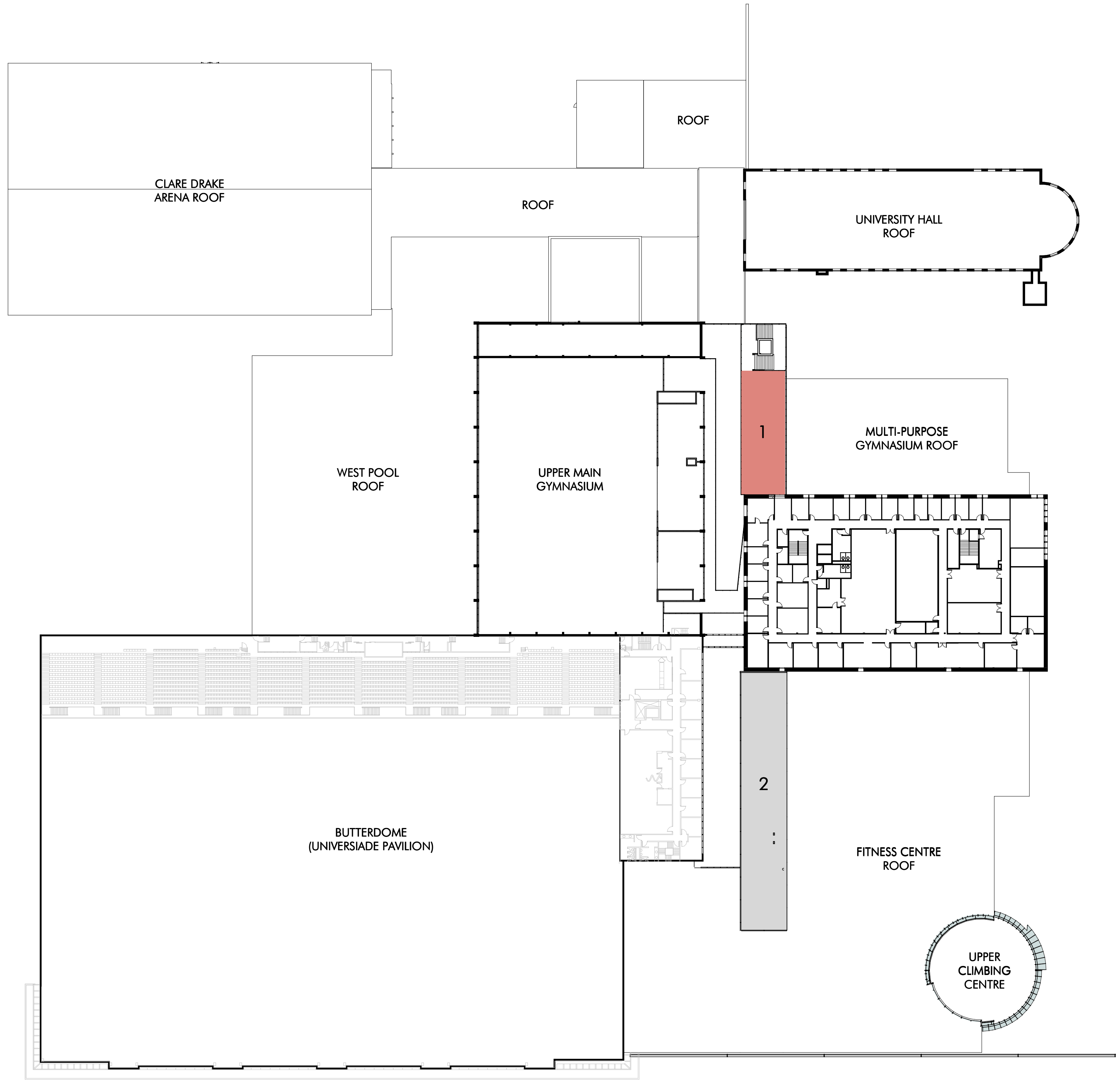
LEVEL 3

SPACE LEGEND

1 STUDENT LOUNGE
2 MULTI-PURPOSE ROOM
3 UPPER CONCOURSE
4 STUDENT QUIET STUDY SPACE (OPTION 1)
5 ALBERTA INSTITUTE OF PHYSICAL ACTIVITY AND HEALTH (AIPAH)
6 PHYSICAL EDUCATION STUDENT LOUNGE
7 PHYSICAL EDUCATION AND RECREATION COUNCIL OF STUDENTS (PERCS)
8 ALBERTA CENTRE FOR ACTIVE LIVING

LEGEND

- STUDENT SERVICES
- CONCOURSE
- RENEWED - ADDITIONAL
- AIPAH



FLOOR PLAN

LEVEL 4

SPACE LEGEND

1 STUDENT QUIET STUDY SPACE (OPTION 2)
2 MECHANICAL PENTHOUSE

LEGEND

STUDENT SERVICES
SERVICE

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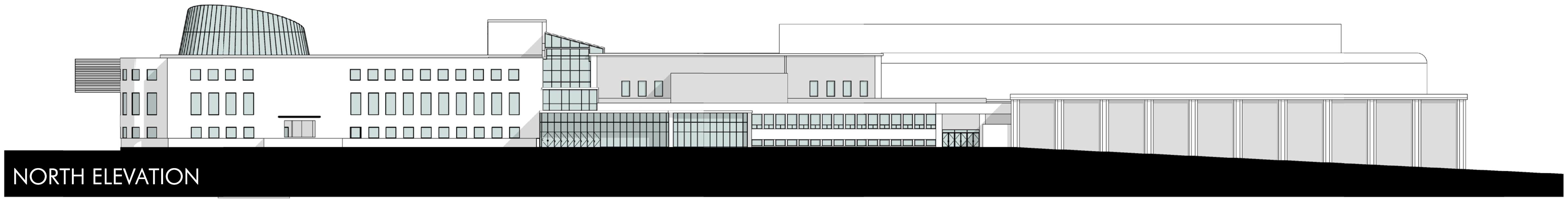
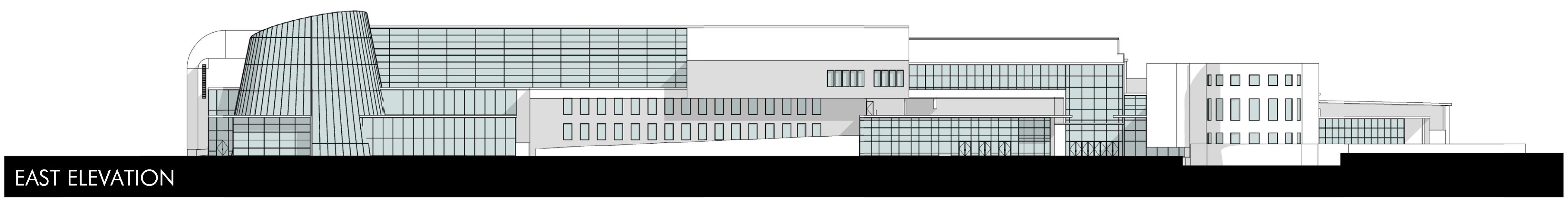
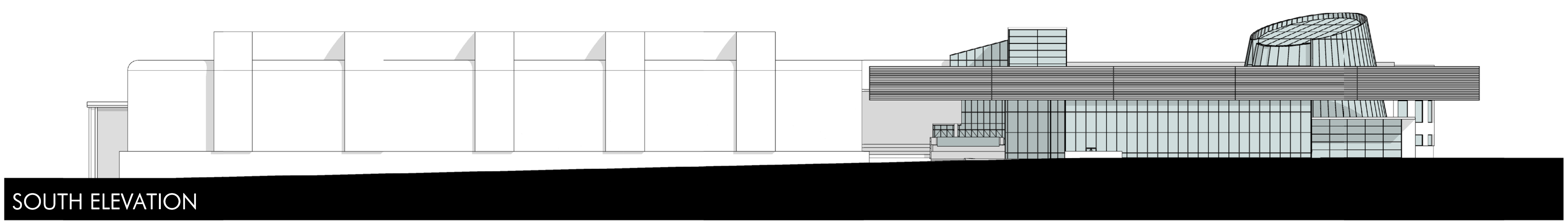


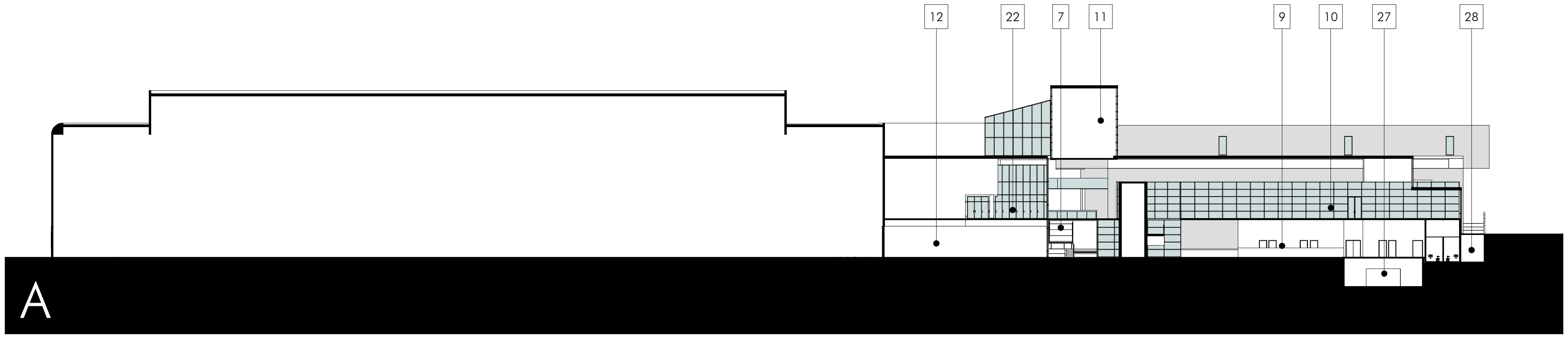
NORTH ELEVATION

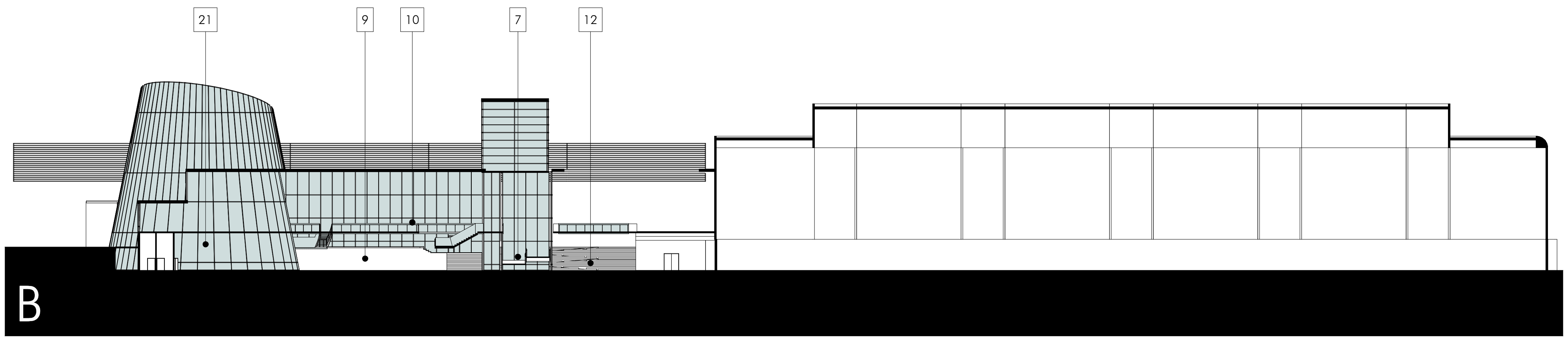


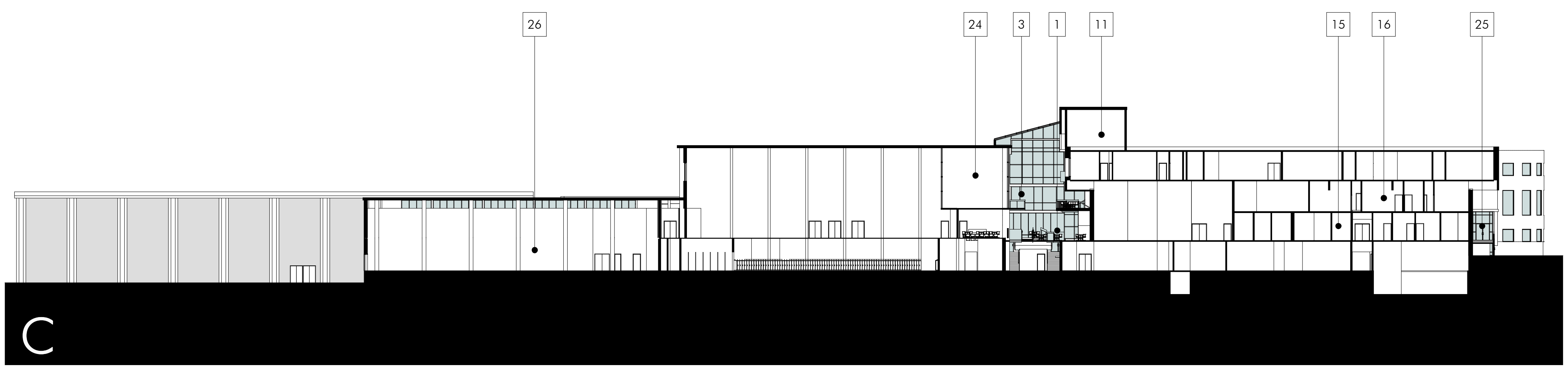
EAST ELEVATION

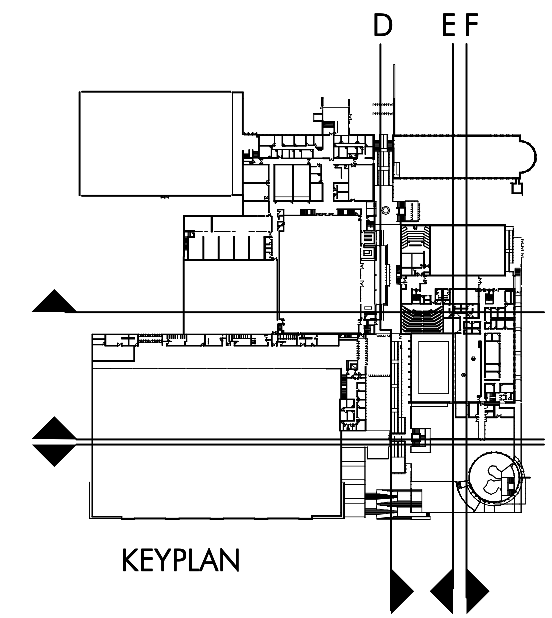


SOUTH ELEVATION





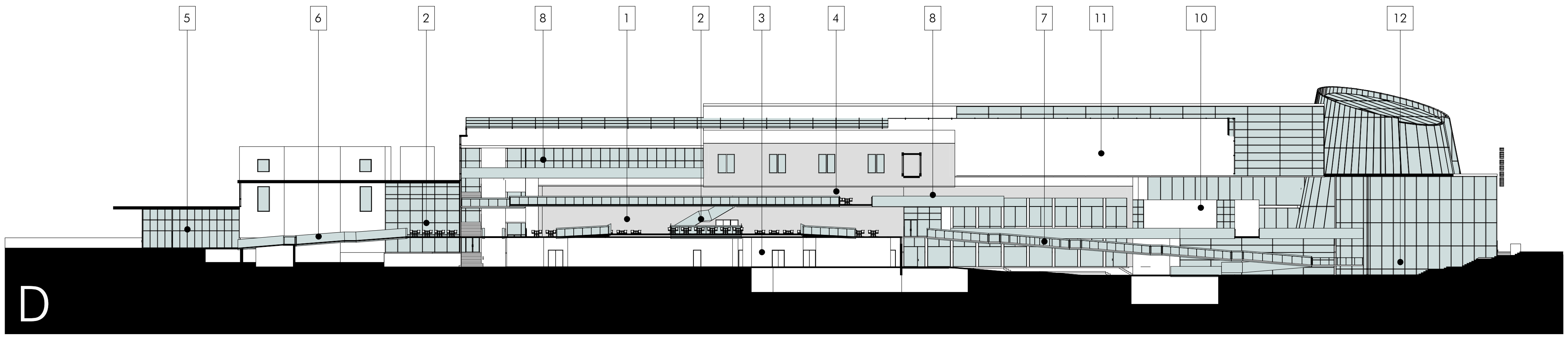


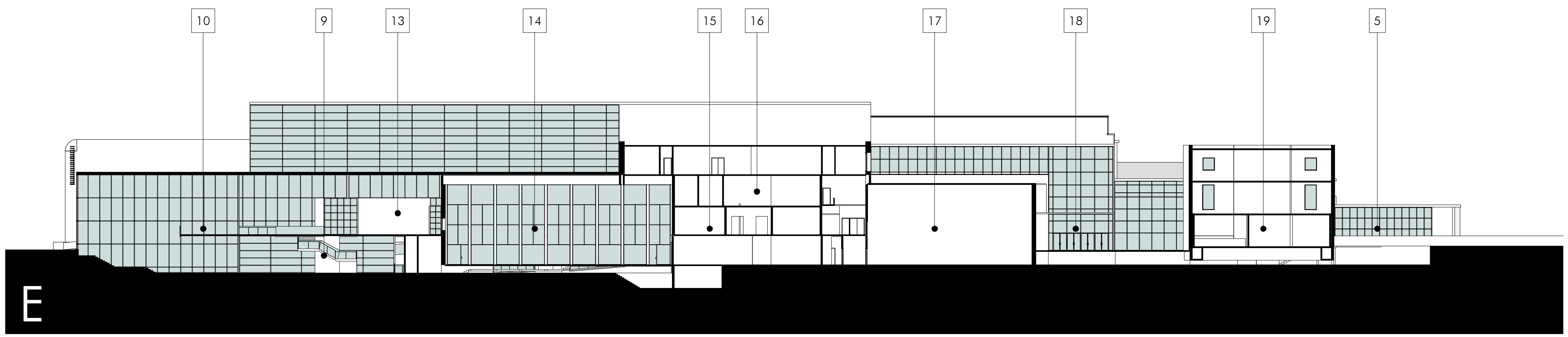


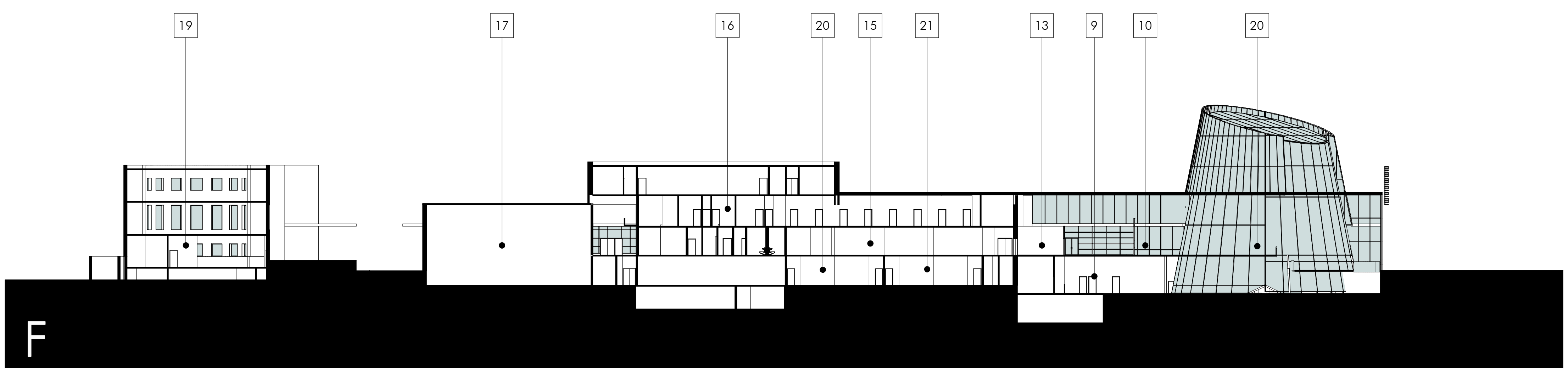
KEYPLAN

LEGEND

1 INTERIOR CONCOURSE
2 STUDENT LOUNGE
3 LOWER CONCOURSE
4 UPPER CONCOURSE
5 NORTH ENTRY
6 NORTH ENTRY RAMP TO CONCOURSE
7 CONCOURSE RAMP TO FITNESS CENTRE
8 QUIET STUDY SPACE
9 FITNESS CENTRE
10 FITNESS CENTRE MEZZANINE
11 MECHANICAL PENTHOUSE
12 LOWER PLAZA
13 FREE TO BE ME
14 EAST POOL
15 STEADWARD CENTRE
16 ALBERTA INSTITUTE OF PHYSICAL ACTIVITY AND HEALTH (AIPAH)
17 MULTI-PURPOSE GYMNASIUM
18 CENTRAL EAST ENTRY
19 UNIVERSITY HALL
20 CLIMBING CENTRE
21 STUDIO/MULTI-PURPOSE ROOMS
22 SOUTH ENTRY
23 LOCKER ROOMS
24 QUIET STUDY SPACE
25 EAST ENTRY
26 WEST POOL
27 MECHANICAL/ELECTRICAL ROOM
28 WALKWAY







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2.3.3 Functional Design

Phasing

Before a fully developed design strategy for the project can be established, it is necessary to analyze and reconfigure the various component parts of the program and position them in the plan in ways that minimize disruption to other unaffected zones and which maximize the opportunities presented by the existing building.

Creative displacement of components and efficient planning ensures the maximum effective deployment of budgeted dollars – where monies are spent to improve the overall circumstance and not remain focused in only one or two specialized areas, at the expense of others.

It is equally critical to ensure that efficient phasing of construction work – through design development – is deployed from the outset. The design must evolve to enable various zones of the building to be completed before other zones begin construction. This is due to two major factors:

- The building complex is a busy place - the reality of which pre determines that it must remain at least partially occupied at all times during construction. It is essential to minimize the amount of academic down time during construction, thus the work on site must be sequenced.

- The project budget and its funding process might also require construction to be phased over a longer period of time, with disruptions. Thus any work that is completed must be able in effect, to stand alone.

The following describes the major components of the program and how each is integrated into the plan:

Concourse/Social Street and Support Services

Consistent with the Master Plan envisioned initially by the Van Vliet Programming Study – A Holistic Vision and as updated and confirmed in the Functional Master Plan Report, the long term plan is derived from a rectangular circulation strategy that connects the complex together in a simple perimeter network of circulation and gathering space, including:

- A future north / south link at the west edge next to the former varsity field that is conceived as an interactive sport park and green space;
- Connections through the Butterdome;
- The existing administration zone, in the east west direction;
- A climate enclosed concourse space between the east Wing and the existing east exterior wall of the main gymnasium to anchor the plan and create a student meeting place and gathering area. The concourse serves as the heart of the renewed plan, providing access to the primary components of the program and encourages interaction in a sun lit social gathering space.

The concourse is accessible from a new entrance to be constructed between University Hall and the Physical Education Administration area on the north of the site, replacing the existing entrance with a larger lobby that enables an efficient transition to the lower Level (1) or the upper or main concourse/ social street Level (2). The existing north entrance to the existing V V C is transformed into a specific entrance for the Faculty Offices and incorporates a new Hall of Fame exhibition area.

Existing Wall of Fame

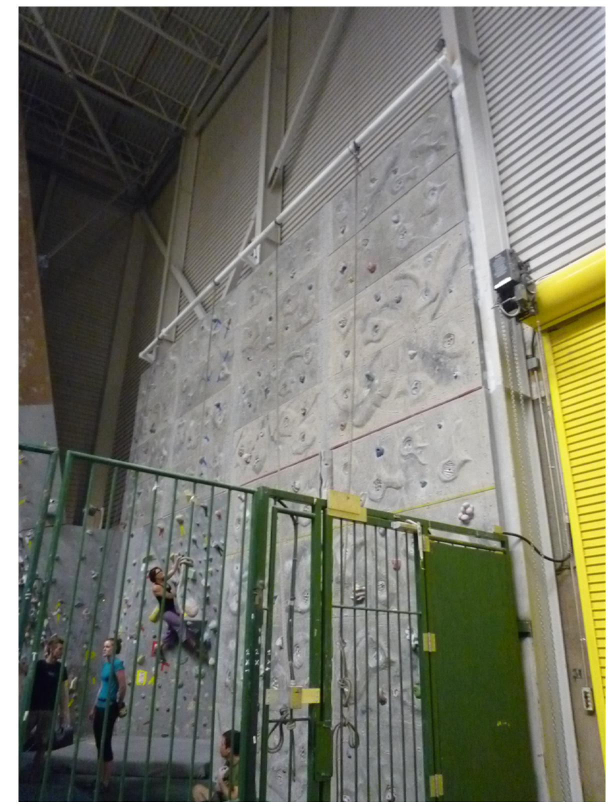
The north entrance is complemented at the south end of the site by a reworked lower wind protected and sun exposed plaza, that expands the existing Butterdome exit plaza at Level (1) into a usable activity space. A new accessible exterior ramp against the Butterdome structure replaces the existing stair system to connect to Level (2). This enables the new plaza to become a landscaped open space for use by patrons of the Butterdome at Level (1) as well as an outdoor activity space for the Fitness Centre on suitable days. The plaza is also strategically positioned on axis with the existing crosswalk to the Jubilee site and is next to the existing transit stop.

The new concourse/social street development becomes the social anchor of the complex, is an indoor and outdoor space and clearly demarcates the major entry areas at both ends of the site. The indoor concourse overlooks the Fitness Centre and separates users from visitors and public space over two levels as follows:

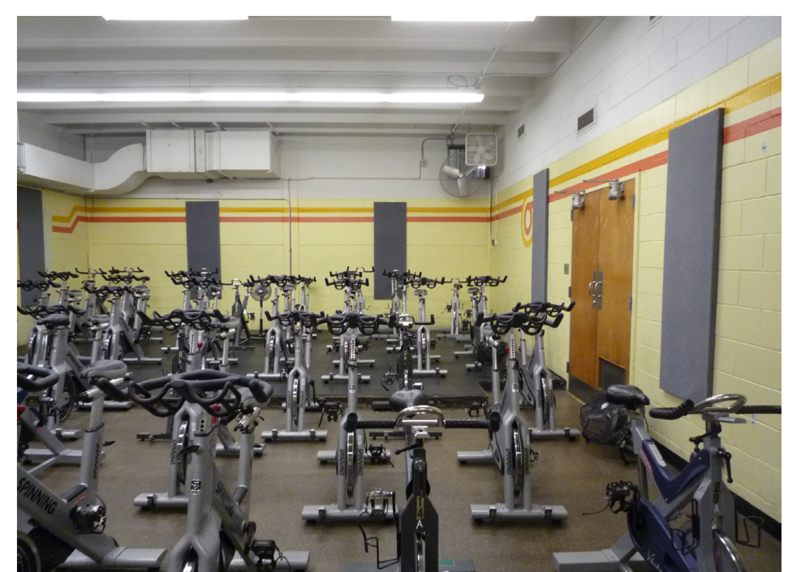
The controlled access on the lower level facilitates a more efficient deployment of space for lockers and support facilities. Daylight that is currently lacking in this area is introduced via floor openings that contain stairs and light wells to bring the sun down to this level through the top lighted (clerestory) concourse roof. With careful planning it is possible that the sun can see into this corridor at certain times of the day. The locker facility at this level is renewed with both male and female lockers on the west pool side to eliminate the dysfunctional cross over that is currently necessary for women going from the east wing (where their lockers are presently), to the west pool. This is achieved by expanding the locker facilities into the area currently used as the fitness area (West Gym), creating more available space at this level. This former auxiliary gymnasium is also intended to have another floor built within its existing volume at Level (2) creating more useable space at Level (2) as well. It is here where the replacement squash courts can be installed, while the former racquet courts area across the corridor can be restored, thus keeping the new courts facilities in close proximity to each other. Another benefit of this strategy is the existing east gym and dance studio which is larger and better equipped than the former auxiliary gym remains intact as an auxiliary gym and dance studio.

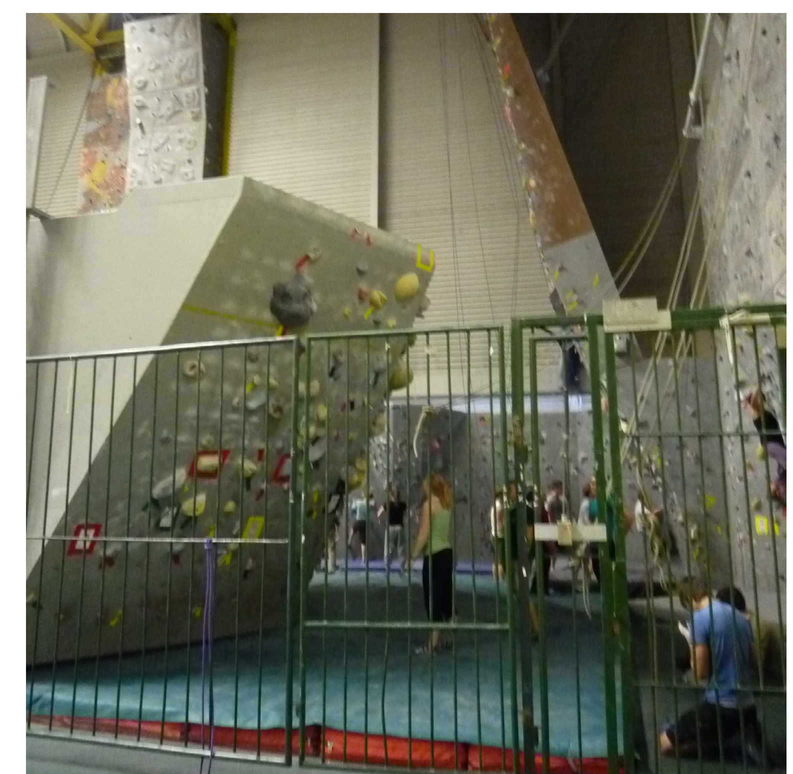
The locker area and support space in the east wing will also be upgraded for other program areas such as multi-purpose rooms/fitness studios as required. Club locker room facilities are being considered as a part of a future renovation of the locker rooms.

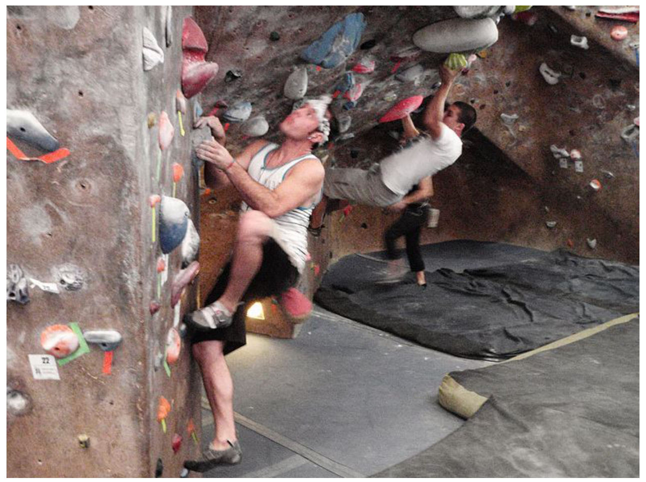
The main Concourse area at Level 2 is the primary public realm. Here, student services are readily visible along its length and the network of circulation expands to include public access into the east wing – now integrated with the whole, and to the west. A major feature at this concourse level is the removal and relocation of the existing coaches offices to make the entire east wall of the gymnasium visible to the concourse, maximizing the dynamic nature of the place. The existing gymnasium upper balcony will have its wood framed bleacher assemblies removed and be reconfigured into smaller glass enclosed multi-purpose rooms that overlook the concourse and the gym. These spaces will receive an abundance of daylight and sunshine during the course of the day.


Existing Climbing Centre

Existing Climbing Reception / Equipment Desk

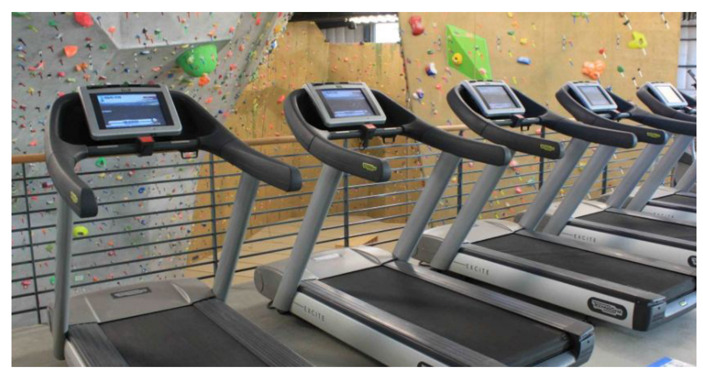

Existing Fitness Studio - Reving Room


Existing Climbing Centre

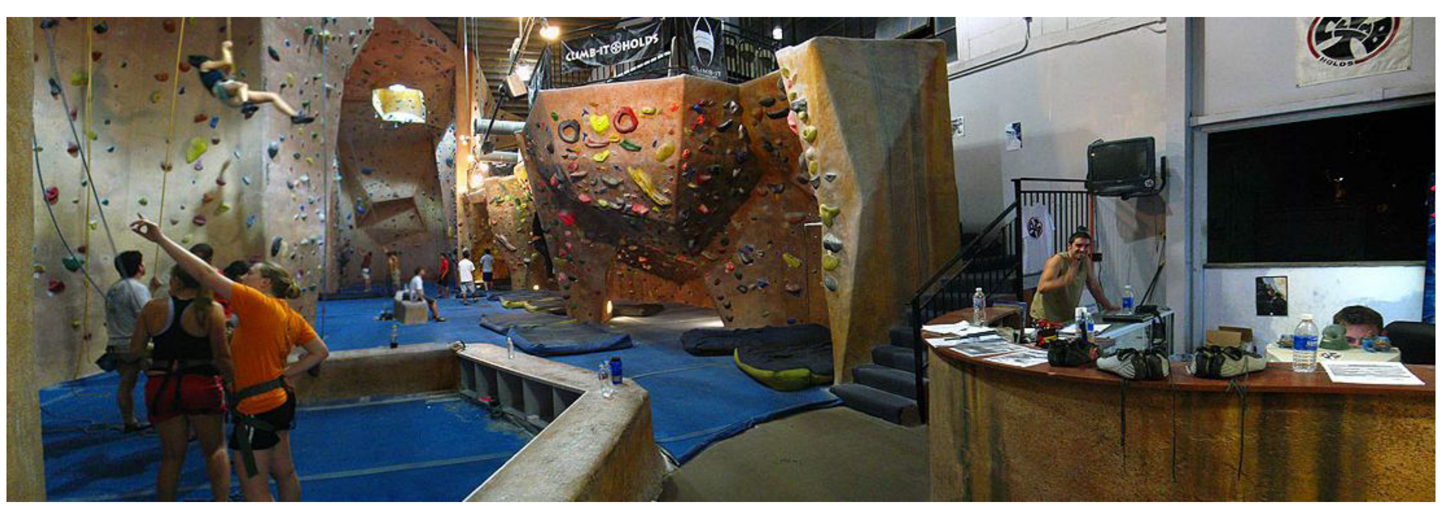


Precedent - Climbing Wall

Precedent - Climbing Wall Viewing Area



Precedent - Fitness Area / Climbing



Precedent - Climbing Wall

Fitness Centre and Climbing Centre

The Fitness Centre is the focal point of the PAW Centre. Located at the south east corner of the site, the major activity areas are deployed over two primary Levels (1 and 2) with its main entrance at the same Level (1) as the locker rooms and connected to Level (2) by a long 'athlete's ramp that flanks the west wall of the east pool, providing an overlook into it as well as a usable space for low impact cardio exercise, such as stretching, walking and cool downs. Thus the circulation space is also used for meaningful activity, maximizing efficiencies wherever possible.

In this regard, it is also possible with proper security and control to locate some fitness equipment (stationery bikes, stairmasters, etc) in the concourse area at Level (2) in more open and social zones – to respond to currently popularized sites in facilities visited on some US campuses. Thus a wide variety of venues is possible – from private to public.

Over the two levels that service the fitness centre, each is demarcated to serve specific program needs for The Steadward Centre and for fitness programs and will be suitably zoned and secured, however the entire area will be able to look out to the crossroads – the intersection of 114th Street and 87th Avenue. Bordered by open space and perimeter landscaping and the lower plaza next to the Butterdome, this area is a high profile transparent activity zone – visible to the street and visible from the street.

The Climbing Centre with its wall assembly soaring fully 50 feet into the sky, and incorporating an integrated bouldering centre that climbs to the pinnacle of the wall assembly as well is a sculptural installation – and is the centre piece of the Fitness Centre. The climbing centre will also be an exciting spectator oriented installation - within the fitness centre or as a pedestrian passing by the site. The thrill of watching climbers especially at the higher levels is always a sight to behold for the uninitiated. This promises therefore to provide the facility with an unmistakable, dynamic image at the gateway to the campus.

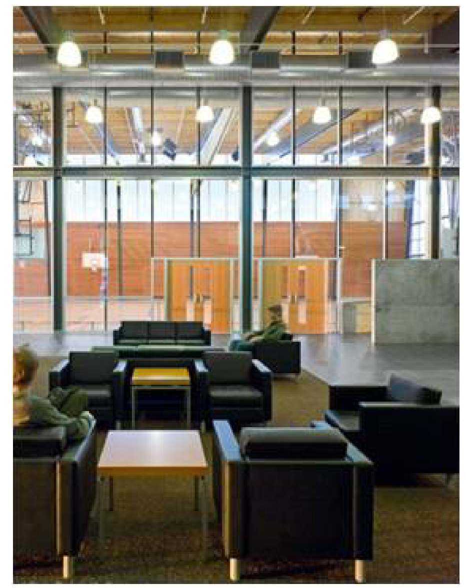
Existing Concourse (Future Student Services Space)

Existing Campus Recreation Centre (Relocated near entry to locker room)

Existing Gymnasium / Viewing Area (Future Multi-Purpose Rooms / Quiet Study Space)

Existing Locker Area


Precedent - Student Lounge


Precedent - Student Social Space


Precedent - Teaching Kitchen

Precedent - Teaching Kitchen

Student Services

High visibility is given over to student spaces. Since the concourse/social street also serves as a major informal gathering and lounge area, not unlike that found in the various locations within SUB, it is expected that organized student events can also take place along its length without interfering with the efficient flow of people at the lower Level (1) between each of the component programs. A social lounge, commercial spaces and teaching kitchen are integrated with the social street.

By situating more of the student services programs along the length of the concourse on Level 1 and Level 2, the flow of people is more concentrated here and activity more visible. As such, this planning strategy, alongside the refined program area requirements has eliminated the need for a fourth level.

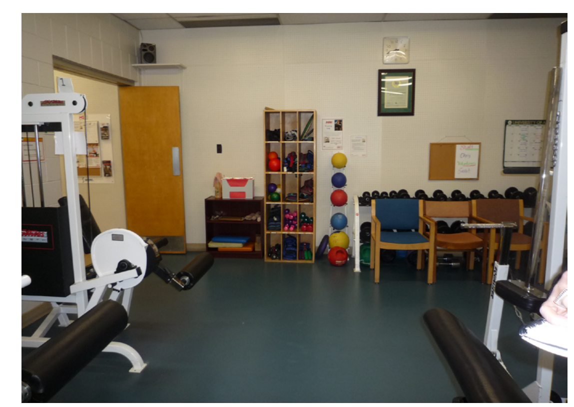
The multi-purpose rooms are proposed to occupy space on the gymnasium mezzanine with views into the concourse.

Two options for a quiet student study lounge zone are contemplated, one overlooking the concourse at Level (3) and the other on Level (4). It will nevertheless remain visible to other parts of the complex.


Existing Steadward Fitness Centre


Existing Steadward Fitness Centre


Existing Free to Be Me


Existing Steadward Fitness Centre

Existing Free to Be Me


Existing Free to Be Me

Existing East Entrance (New Steadward Centre Entrance)

Existing East Entrance (New Location for Steadward Centre)

The Steadward Centre

The Steadward Centre requires additional space to serve its clients. The design will provide an enhanced sense of place which would elevate this environment and as a result - the users. It also requires a functional and prominent barrier-free entrance and drop off zone with convenient access for users, DATS and private vehicles.

The existing two storey entrance at the north east corner of the East Wing provides such an opportunity. Located at the north end of the existing loop system for vehicle drop off on 114th street, this location is a natural solution to suit the various needs of this particular user group. The existing drop off zone includes adequate short term parking space and generous circulation area to enable a spacious new entry to be developed that would feature an enclosed entrance ramp and a glass canopy to provide a stronger image than the current condition – and all of this is accomplished without removing the mature street trees. A significant entrance development here, incorporating a maximum use of glass (by removing the precast concrete panels of the east façade) alongside improved landscaping and parking geometries promises to change the perception of this area as cold and bleak – where a handsome interior two storey lobby nonetheless exists today. This lobby also leads to the concourse levels as well, thus the idea of high profile address for The Steadward Centre and another significant public entrance to the complex can be achieved along the axis of the main street to the campus (114th Street).

Within this lobby a ramp is provided which is currently proposed to be at a slope of 1:15 (1 vertical foot to 15 horizontal feet) in order to ease the transition up to the concourse level. Alternatively, there is an exterior ramp that is proposed on the exterior of the building that is 1:20 (1 vertical foot to 20 horizontal feet). This width of both of these ramps are sized to accommodate two wheel chairs/scooters side by side. Handrails will be provided on both sides of each ramp. As with the entire PAW centre, universal design principles will be implemented throughout The Steadward Centre.

The existing courts facilities do not align with current standards. The plan is to replace these courts with new units that do meet current standards. The double height space that exists where the courts are found today is redeveloped into a two level plan (by constructing an interstitial floor) with the north east lobby serving as the main entrance. Thus it is possible to locate the entire The Steadward Centre on the concourse Level (2) with convenient access to it internally as well, from existing corridors and the two storey lounge spaces of the east wing adjacent to the auxiliary gymnasium. The connections to it are thus improved dramatically from the inside as much as from the outside.

Further, the Fitness component of The Steadward Centre, including the Free to be Me component space can be positioned adjacent to the main Fitness Centre and enjoy the same views to the outside as well. Because this space is also at Level (2) – which is a half level above the street, issues of visual privacy are automatically addressed as well – it is easier to see out than to see in to this area.

The east elevation of the East Wing is comprised of a precast concrete panel system and a series of load bearing and column / beam structural systems. The precast panels and back up wall systems are removed and replaced with a glass curtain wall to enable the façade of the East Wing to be altered to become more interesting and transparent while affording occupants of The Steadward Centre interior significant exterior windows, daylight and morning sunshine.


Existing Upper Level Courts


Existing Upper Level Courts

Alberta Institute of Physical Activity and Health (AIPAH)

The oversized and double height volume of the existing courts area enables the new floor addition above The Steadward Centre that aligns with the existing third level of the East Wing. This creates another full floor for the AIPAH component of the program. It also takes advantage of the existing two storey lobby area to define its entrance and since it is positioned directly over the new area for The Steadward Centre, the areas can be somewhat interconnected, in close proximity to one another. Certain program components can also be shared.

The third level of the East Wing is a less public, quiet and more academic atmosphere, adjacent to existing graduate student work space. This level also connects the concourse/social street by providing access from it to the new mezzanine and quiet student study area as well.

The precast concrete wall of the east elevation will be removed at this new level as well to provide a wall of glass to bring daylight and sunshine to the AIPAH component, ensuring that faculty offices and labs receive natural light and all work areas meet the expected office area and quality standards of the institution.

Exterior Rendering

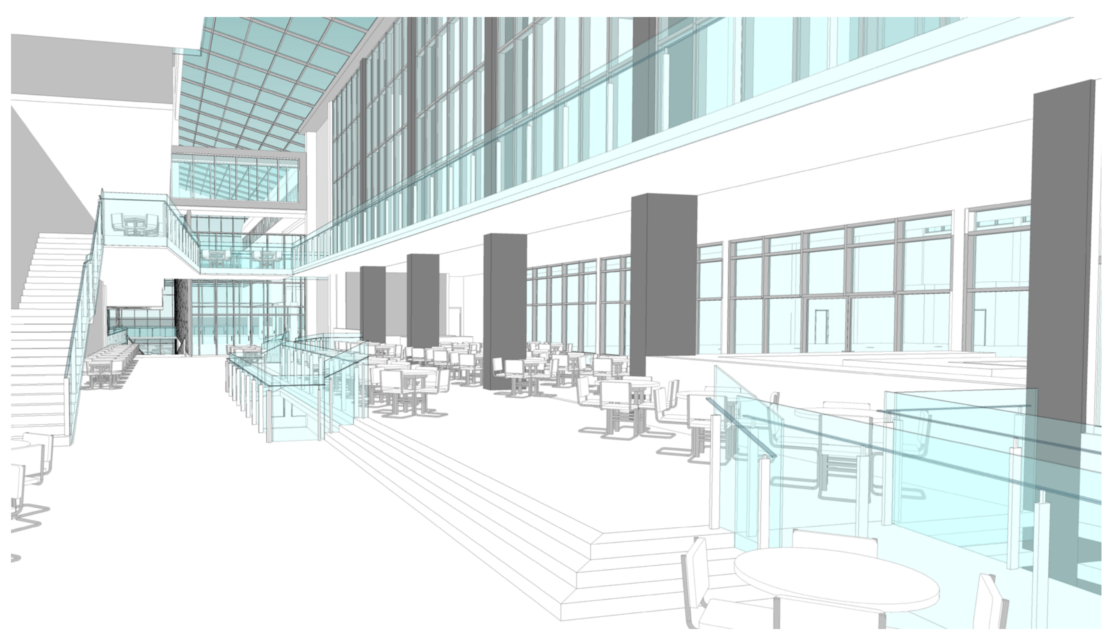
2.3.4 Exterior Treatment - Elevations, Massing and Materiality

The PAW centre project is challenged by the need to bring into a coherent architectural composition, a disparate collection of buildings that have been developed over a number of years using materials from stucco, brick and precast concrete to yellow metal panels. With little consideration for the creation of an overall image in the process, the schematic design addresses the corner of 114th Street and 87th Avenue as the front door for the facility, the north east entry as the Steadward Centre address and the north entry lobby as a significant relationship to the Student Union Building. Each is designed to recognize the scale and importance of the adjacent buildings or intersections.

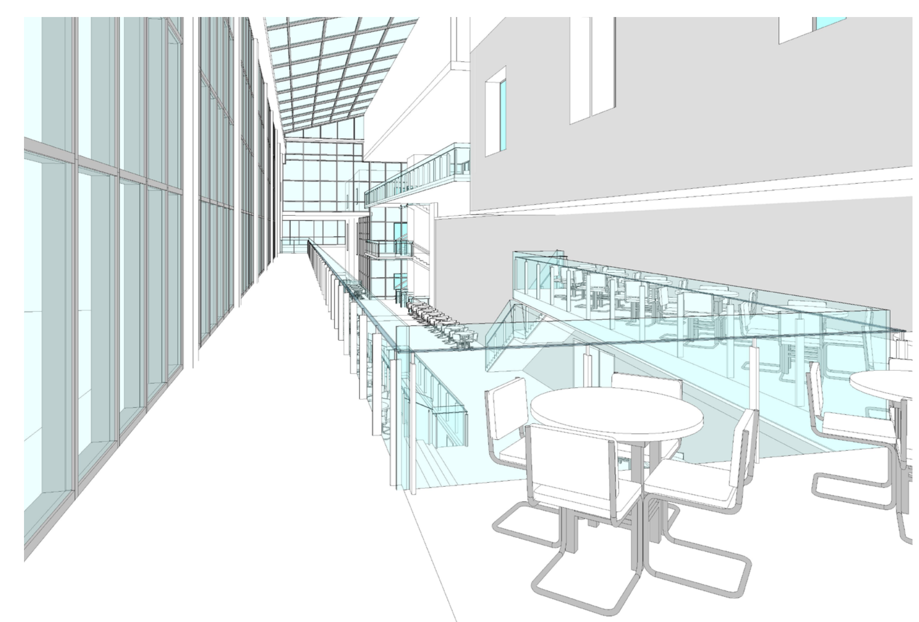
A large, delicate screen wall hovers above the glass enclosure that defines the transparency of the Fitness Centre to the street while it softens the impact of the solid coloured walls of the Butterdome on 87th Avenue with a refined texture, with the possibility of including a collection of photovoltaic panels. This screen provides a clear image of the building from a distance – and relates to the tradition of a clearly linear building composition on campus – from the HUB Mall to smaller buildings such as Triffo Hall and to the new Edmonton Clinic Health Academy .
A dramatic structure punctuates the corner of the site. This enclosure defines the Climbing Centre, which is a glass mountain metaphor, using white sandblasted translucent panels (like ice) and vision glass to enable people to see into the spaces during the day and at night, when the entire enclosure is illuminated as a beacon.

The materials that make up the majority of the PAW Centre are simple combinations of glass and aluminum. These light, delicate materials wrap the periphery of the new construction on all sides of the building to visually tie each of the disparate buildings together with a consistent and recognizable pattern and image of glazing components, screens and human scaled proportions, in all of the lobbies, entries, courtyards, plazas and street edges. These each act as a foreground foil to the variety of brick, precast concrete and coloured metal panels that make up the existing buildings. The project is actually conceived as a collection of infill structures, each requiring the use of light and delicate materials to minimize structural loads on existing footings and ease of construction, to enable the maximum penetration of natural light and to provide a degree of transparency not otherwise available in the existing buildings.

In addition, the massing of each of the components - from the Fitness Centre, the Climbing Centre, concourse, entry lobbies, canopies and penthouses each in one way or another are aligned with the existing floors, ceilings or roofs of the existing buildings, establishing a sense of order that did not exist before.



Interior Rendering



Interior Rendering

2.3.5 Wayfinding

The overriding concern of the existing layout of the Van Vliet Centre is its circuitous circulation system whereby students and visitors have difficulty finding their way to specific areas or have little break out or ‘crush’ space in the crowded corridors during event days.

As is explained in the description of the Concourse area, this problem is eliminated by creating a new enclosed concourse area that serves as a natural gathering and control area for all users and visitors to the facility. As the project proceeds into the design development phase, control points will be finalized to ease the challenges of wayfinding throughout the facility. This will also address the chronic problem of unauthorized access and resulting security concerns.

The openness and multi-level layout of the concourse/social street also provides significant crush space and student oriented services in a central zone of the building, bringing together the students in the west sector with those in the isolated east wing.

The simple and focused north south circulation pattern that defines the concourse fits a overall planning strategy where all other corridors in the building also connect to it, thus simplifying the whole process of navigating through the complex.

PAW CENTRE AREA SUMMARY		
Area Type	Schematic Design Gross Area	Functional Master Plan Program Area *
1 STUDENTS		
1.1 STUDENT SERVICES	920.9 m²	834.4 m²
1.2 FITNESS AREA	2840.8 m²	2234.5 m²
1.3 CLIMBING CENTRE	493.1 m²	691.2 m²
	4254.9 m²	3760.0 m²
2 CONCOURSE		
2.1 CONCOURSE	3256.2 m²	3576.3 m²
	3256.2 m²	3576.3 m²
3 FACULTY		
3.1 AIPAH	1225.6 m²	1243.1 m²
3.2 STEADWARD CENTRE	1846.6 m²	1915.6 m²
3.3 RENEWED	3214.6 m²	3859.0 m²
3.4 RENEWED - ADDITIONAL **	1595.6 m²	0.0 m²
	7882.4 m²	7017.7 m²
4 SERVICE		
4.1 SERVICE	407.5 m²	0.0 m²
	407.5 m²	0.0 m²
Grand total	15800.9 m²	14354.0 m²

* Program Area is grossed up from Net Assignable (refer to individual Area Type for factor specific to that section)

** This area was not included in the original Functional Master Plan program

2.4 CURRENT PROGRAM / RECONCILIATION

The Functional Master Plan Report was approved by the Facility Development Committee on November 25, 2011. The functional areas and the functional program floor plans and sections documented in the study were used as the basis for the development of the design. The design team recognized that the project budget is tight and the team is working diligently to prevent scope creep through the expansion of the program.

The Functional Master Plan Report identified a total gross floor area (GFA) of 14,354 square metres (154,505 square feet). In order to make an accurate comparison, the area for the squash courts addition to the west of 820 square metres (8826 square feet), which has not been included in the design, should be subtracted from the Functional Master Plan program area. This results in a Functional Master Plan program area of 13,534 square meters (145,679 square feet).

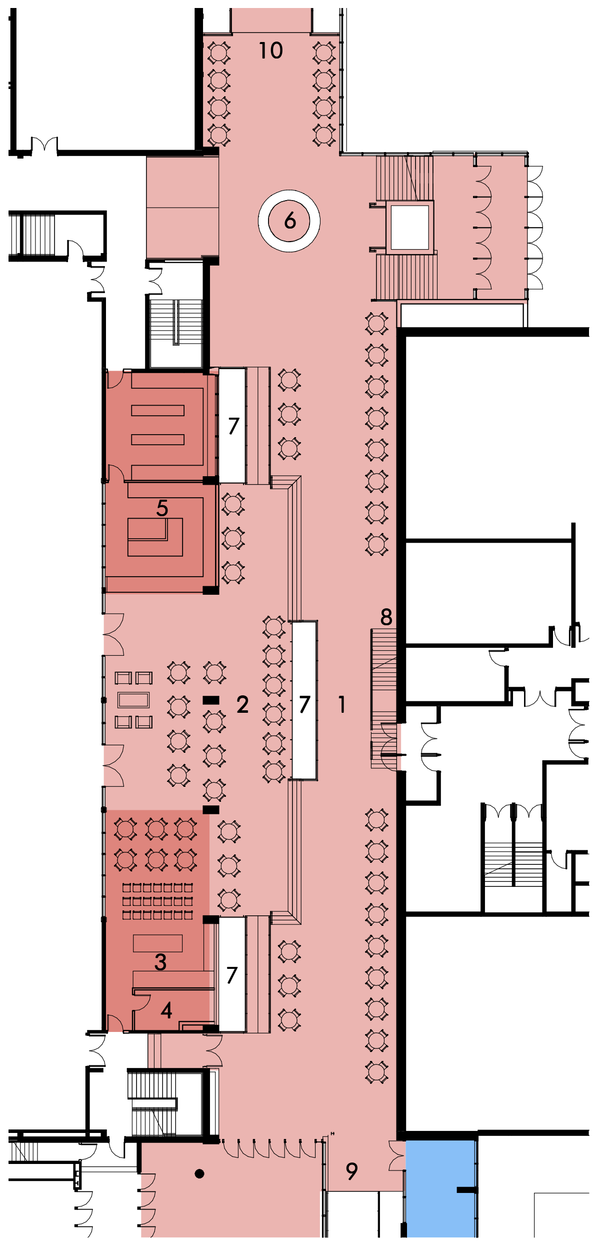
The current GFA of the design including the additional renewed areas is 15,801 square metres (170,080 square feet). During the design it was recognized that with the insertion of the PAW Centre program some additional areas of the existing V V C, East Wing and Universiade Pavilion would need to be renewed for the decanting of Faculty program dislocated by the design. The GFA of the additional renewed space is 1,596 square metres (17,175 square feet). (See expanded description of additional renewed area toward the end of this section). If the GFA is reviewed without the additional renewed space (as these areas were not identified in the Master Plan), the design area is reduced to 14,205 square metres (152,905 square feet). The comparable difference between the design area excluding the renewed additional space and the program area excluding the addition is 671 square metres (7223 square feet).

1.1 STUDENT SERVICES AREA			
Room Name	Schematic Design Gross Area	Functional Master Plan Program Area *	Comments
LEVEL 1			
ACTIVITY REGISTRATION ZONE/PRO SHOP	107.9 m²	44.8 m²	shared with FPER
GAMES AREA	68.3 m²	67.2 m²	info centre/game distribution on Level 2
	176.2 m²	112.0 m²	
LEVEL 2			
COMMUNITY/TEACHING KITCHEN	80.0 m²	89.6 m²	
FOOD SERVICES VENDOR	87.4 m²	44.8 m²	
STUDENT LOUNGE	131.8 m²	130.0 m²	
	299.2 m²	264.4 m²	
LEVEL 3			
MULTI-PURPOSE ROOM 1	110.1 m²	95.2 m²	
MULTI-PURPOSE ROOM 2	111.7 m²	134.4 m²	
QUIET STUDY SPACE	196.1 m²	201.6 m²	Option 1
STUDENT LOUNGE	27.6 m²	26.8 m²	
	445.5 m²	458.0 m²	
LEVEL 4			
QUIET STUDY SPACE	0.0 m²	0.0 m²	Option 2 (193 sq.m.)
	0.0 m²	0.0 m²	
Grand total	920.9 m²	834.4 m²	

* Gross up factors of 5% for circulation & walls and 7% for mechanical, electrical & structural allowance (12% total) are included in Program Area values

2.1 CONCOURSE AREA SUMMARY			
Room Name	Schematic Design Gross Area	Functional Master Plan Program Area *	Comments
LEVEL 1			
CONCOURSE LEVEL 1	1262.1 m²	408.8 m²	
CORRIDOR	434.6 m²	0.0 m²	east connection to climbing centre
RAMP	47.6 m²	0.0 m²	Pavillion connection
	1744.3 m²	408.8 m²	
LEVEL 2			
CONCOURSE LEVEL 2	1264.9 m²	3167.5 m²	
	1264.9 m²	3167.5 m²	
LEVEL 3			
CONCOURSE LEVEL 3	247.0 m²	0.0 m²	
	247.0 m²	0.0 m²	
Grand total	3256.2 m²	3576.3 m²	

* Gross up factors of 2% for circulation & walls and 7% for mechanical, electrical & structural allowance (9% total) are included in Program Area values



STUDENT SERVICES AREA - LEVEL 2

SPACE LEGEND

1 MAIN CONCOURSE (SOCIAL STREET)
2 STUDENT LOUNGE
3 COMMUNITY / TEACHING KITCHEN
4 STORAGE / PREP AREA
5 FOOD VENDOR
6 STUDENT INFO KIOSK
7 OPEN TO LOWER CONCOURSE
8 STAIR UP TO UPPER CONCOURSE
9 RAMP DOWN TO FITNESS CENTRE
10 RAMP DOWN TO NORTH ENTRY

Program Descriptions

Student Services

- Functional Program GFA for Student Services
  834 square metres (8,981 square feet)

- Current Design GFA for Student Services
  921 square metres (9,912 square feet)

Functional program areas attributed to Student Services spaces include multi-purpose rooms, a games room, social spaces, quiet study spaces, a community kitchen, and commercial spaces (food kiosks and or pro shop). The design clusters the Student Services spaces on the Concourse/Social Street on multiple levels. Refer to section 2.3.2 for additional floor plans.

Interior Concourse/Social Street

- Functional Program GFA for the Concourse/Social Street
  3,576 square metres (38,495 square feet)

- Current Design GFA for the Concourse/Social Street
  3,256 square metres (35,049 square feet)

The PAW Centre project proposes the enclosure of the north south pathway between the V V C and the East Wing. The creation of the interior concourse or social street will provide an enclosed connection between these areas and the PAW Centre, creating a strong organizing and social element with prominent entrances on the north side across from the Students' Union Building and on the south at 87th Avenue. In addition to being the circulation spine for the PAW Center, the concourse/social street will become a place to meet and socialize with some of the student services occupying the space or opening onto the space.

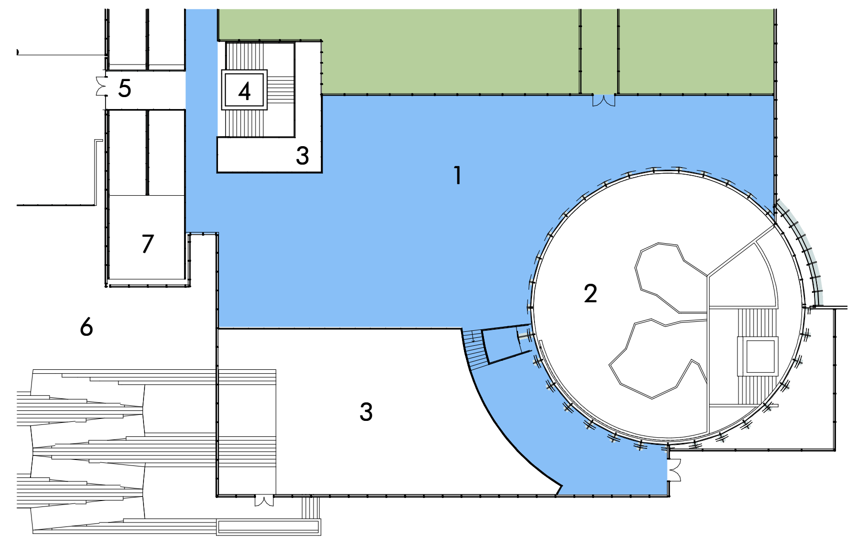
The Interior Concourse/Social Street has been modified from the functional program plan to take into consideration allowable exiting distances required by the Alberta Building Code.

1.2 FITNESS CENTRE AREA			
Room Name	Schematic Design Gross Area	Functional Master Plan Program Area *	Comments
LEVEL 1			
CONSULTING ROOM 1	13.8 m²	13.8 m²	
CONSULTING ROOM 2	13.8 m²	13.8 m²	
CONSULTING ROOM 3	13.8 m²	13.8 m²	
CONSULTING ROOM (LARGE)	21.1 m²	23.0 m²	
EQUIPMENT / MAINTENANCE	25.7 m²	27.6 m²	
FILE STORAGE	11.9 m²	12.7 m²	
FITNESS CENTRE	1370.4 m²	1000.0 m²	
MEETING ROOM	22.9 m²	0.0 m²	
OFFICE 1	12.8 m²	12.7 m²	
OFFICE 2	13.0 m²	12.7 m²	
PHOTOCOPY AREA	6.4 m²	4.6 m²	
RECEPTION	22.3 m²	18.4 m²	
STORAGE	39.6 m²	23.0 m²	
STUDIO 1 (RENEWED AREA)	97.9 m²	97.8 m²	
STUDIO 2 (RENEWED AREA)	78.3 m²	97.8 m²	
STUDIO 3 (RENEWED AREA)	78.9 m²	97.8 m²	
STUDIO 4 CYCLE (RENEWED AREA)	101.5 m²	97.8 m²	
WASHROOMS	25.7 m²	0.0 m²	
	1969.5 m²	1567.0 m²	
LEVEL 2			
FITNESS CENTRE	871.4 m²	667.5 m²	
	871.4 m²	667.5 m²	
Grand total	2840.8 m²	2234.5 m²	

* Gross up factors of 8% for circulation & walls and 7% for mechanical, electrical & structural allowance (15% total) are included in Program Area values

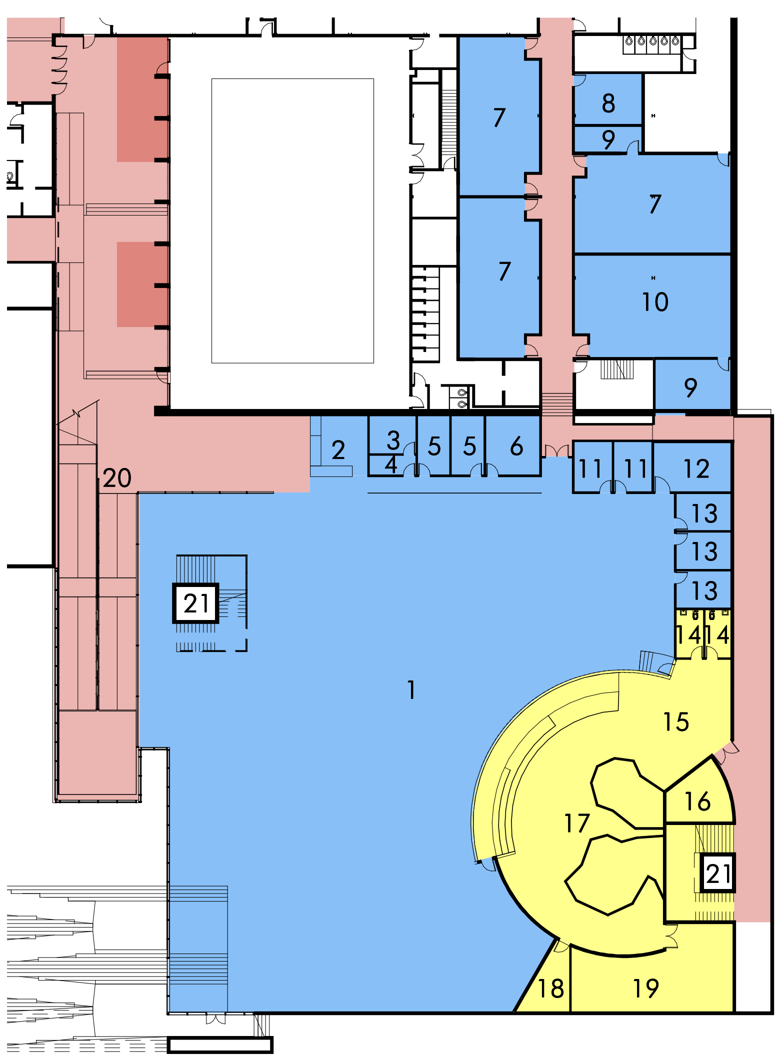
1.3 CLIMBING CENTRE AREA			
Room Name	Schematic Design Gross Area	Functional Master Plan Program Area *	Comments
LEVEL 1			
CHANGE ROOM / WASHROOM	17.6 m²	27.6 m²	
CLIMBING CENTRE	298.7 m²	471.5 m²	vertical bouldering to be developed
LOBBY / WAITING / VIEWING	64.9 m²	92.0 m²	
OFFICE	16.3 m²	13.8 m²	
RECEPTION / EQUIPMENT DESK	20.8 m²	17.3 m²	
STORAGE / STAFF MAINTENANCE AREA	74.6 m²	69.0 m²	
	493.1 m²	691.2 m²	
Grand total	493.1 m²	691.2 m²	

* Gross up factors of 8% for circulation & walls and 7% for mechanical, electrical & structural allowance (15% total) are included in Program Area values



FITNESS CENTRE MEZZANINE - LEVEL 2

SPACE LEGEND
1 FITNESS CENTRE MEZZANINE
2 CLIMBING CENTRE BELOW
3 OPEN TO FITNESS CENTRE BELOW
4 ELEVATOR
5 ACCESS TO SOUTH ENTRY
6 LOWER PLAZA BELOW
7 RAMP BELOW



FITNESS CENTRE & CLIMBING WALL AREA - LEVEL 1

SPACE LEGEND
1 FITNESS CENTRE
2 RECEPTION / ENTRY
3 FILE STORAGE
4 COPY ROOM
5 OFFICE
6 CONSULTING ROOM (LARGE)
7 STUDIO
8 MEETING ROOM
9 STORAGE
10 STUDIO (REVING / SPIN ROOM)
11 WASHROOMS
12 EQUIPMENT / MAINTENANCE
13 CONSULTING ROOMS (SMALL)
14 UNISEX CHANGE ROOM
15 LOBBY / WAITING / VIEWING
16 RECEPTIONS / EQUIPMENT DESK
17 CLIMBING WALL AREA
18 OFFICE
19 STORAGE / STAFF WORK AREA
20 RAMP UP TO MAIN CONCOURSE
21 ELEVATOR

Fitness Centre

- Functional Program GFA for the Fitness Centre
  2,235 square metres (24,052 square feet)

- Current Design GFA for the Fitness Centre
  2,841 square metres (30,578 square feet)

In the functional planning of fitness centres for campuses a ratio of 0.0929 square metres (1 square foot) of space for every student on campus is used when designing fitness centres. The current fitness centre design will accommodate a user population of 30,579 students and staff. In meetings with the V V C operational staff and by comparison to other facilities across the country it was determined that a GFA of 2,311 square meters (24,875 square feet) for the fitness area (cardio/weights) would be ideal. The combined GFA of both levels of the fitness area is 2,241 square metres (24,122 square feet). For comparison the existing fitness area in the V V C is 828 square metres (8,913 square feet). In addition the Fitness Centre program includes multipurpose studios, reception, consulting rooms, offices, equipment repair and storage. The main entrance to the fitness centre is accessible from the social street via an athletes ramp or from the user concourse where the locker rooms are located. There is also a stair and elevator within the centre itself.

Climbing Wall

- Functional Program GFA for the Climbing Centre
  691 square metres (7,440 square feet)

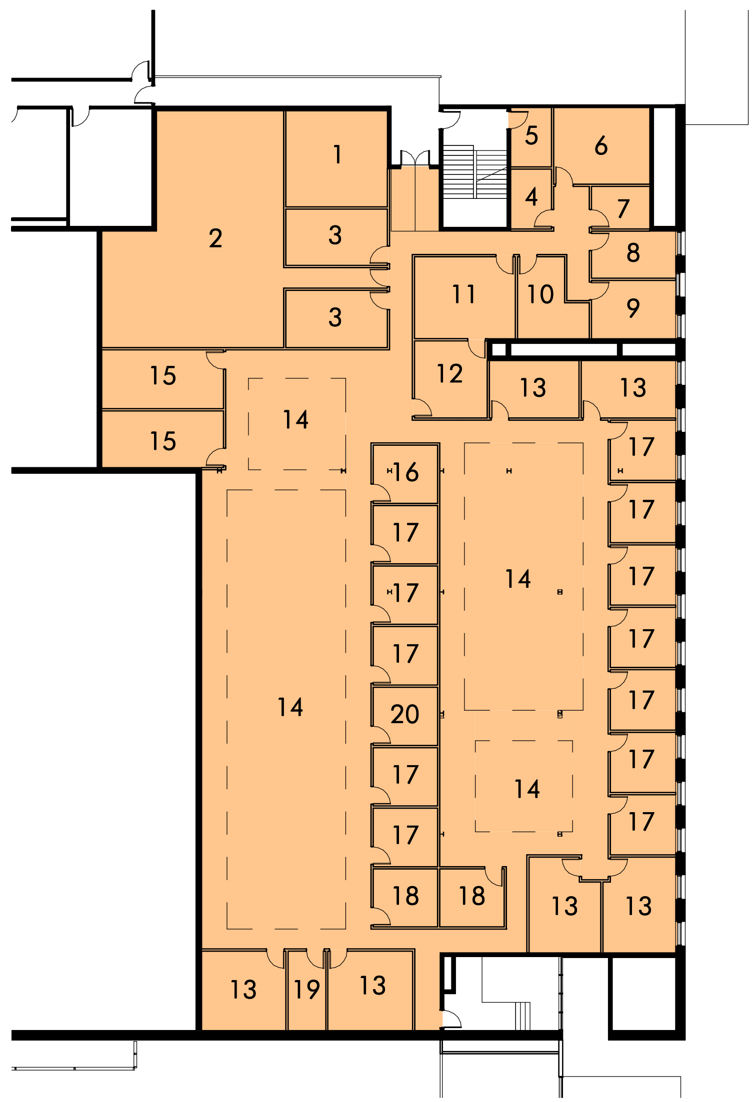
- Current Design GFA for the Climbing Centre
  493 square metres (5,308 square feet)

The climbing wall program will be relocated from the Universiade Pavilion and co-located with the Fitness Centre. The program for the climbing wall will include a larger bouldering area, reception/equipment rental space, a small viewing area, office space, storage space, and unisex change rooms.

The GFA identified for the design represents the floor area at the base of the wall and the support spaces. The design envisions that the bouldering component will spiral around the top rope wall taking advantage of the high volume of the climbing centre as well as the views for all climbers.

3.1 ALBERTA INSTITUTE OF PHYSICAL ACTIVITY AND HEALTH (AIPAH) AREA			
Room Name	Schematic Design Gross Area	Functional Master Plan Program Area *	Comments
LEVEL 3			
ADMIN - COPY ROOM	14.3 m^2	13.8 m^2	
ADMIN - EXECUTIVE DIRECTOR	15.3 m^2	17.5 m^2	
ADMIN - LARGE MEETING ROOM	21.5 m^2	25.0 m^2	
ADMIN - PRIVACY ROOM	7.6 m^2	9.4 m^2	
ADMIN - RECEPTION	24.2 m^2	18.8 m^2	
ADMIN - SCIENTIFIC DIRECTOR	12.4 m^2	13.8 m^2	
ADMIN - SERVER ROOM	7.5 m^2	0.0 m^2	
ADMIN - WORKSTATIONS	7.7 m^2	13.8 m^2	
ADMIN -FILE STORAGE	11.3 m^2	13.8 m^2	
ALBERTA CENTRE FOR ACTIVE LIVING	29.1 m^2	27.5 m^2	
CENTRAL TESTING	112.9 m^2	125.0 m^2	
CIRCULATION	235.8 m^2	0.0 m^2	18% circulation allowance included within each program area
KITCHEN	16.6 m^2	15.0 m^2	
OBSERVATION ROOM	9.5 m^2	11.3 m^2	
OPEN WORKSTATIONS	332.1 m^2	502.5 m^2	based on average 3.6 sq.m. or 6 sq.m. workstation
PRINCIPAL INVESTIGATOR OFFICES	143.4 m^2	165.0 m^2	
RESEARCH - FILE STORAGE	11.3 m^2	13.8 m^2	
RESEARCH OFFICES	22.4 m^2	27.5 m^2	
SEMINAR ROOM	42.3 m^2	50.0 m^2	
TESTING ROOM	114.4 m^2	150.0 m^2	
UNISEX CHANGE ROOMS	34.2 m^2	30.0 m^2	
	1225.6 m^2	1243.1 m^2	
Grand total	1225.6 m^2	1243.1 m^2	

* Gross up factors of 18% for circulation & walls and 7% for mechanical, electrical & structural allowance (25% total) are included in Program Area values



AIPAH AREA - LEVEL 3

SPACE LEGEND

1 ALBERTA CENTRE FOR ACTIVE LIVING
2 CENTRAL TESTING
3 UNI-SEX CHANGE ROOM
4 WORKSTATIONS
5 SERVER ROOM
6 LARGE MEETING ROOM
7 SMALL MEETING ROOM
8 SCIENTIFIC DIRECTOR
9 EXECUTIVE DIRECTOR
10 COPY ROOM
11 RECEPTION
12 KITCHEN
13 TESTING ROOM
14 WORK STATIONS
15 SEMINAR ROOMS
16 ADMINISTRATION FILE STORAGE
17 PRINICPAL INVESTIGATOR OFFICE
18 OFFICE
19 OBSERVATION ROOM
20 RESEARCH FILE STORAGE

Alberta Institute for Physical Activity and Health (AIPAH)

- Functional Program GFA for AIPAH
  1,243 square metres (13,381 square feet)

- Current Design GFA for AIPAH
  1,226 square metres (13,192 square feet)

AIPAH is envisioned to be a pivotal hub for research by members of the FPER. The focus of the research conducted at AIPAH will be a comprehensive and interdisciplinary approach to understanding physical activity and health with a particular emphasis on disease prevention, management, and health promotion. Some of the specific health conditions being researched include cancer, diabetes, cardiovascular health and obesity. Research being done by this group is recognized on Campus and internationally. Because of the focus on health and disease, there would be a benefit to neighbouring the Edmonton Clinic Health Academy, the McKenzie Health Sciences Centre and the Katz Group Centre for Pharmacy and Health Research etc. Since AIPAH is part of the FPER, locating AIPAH in the East Wing Level 3 would provide adjacency to graduate student space on Level 3 and academic office space on Level 4.

The program areas for AIPAH are primarily spaces to accommodate Principal Investigators (academic faculty), graduate students, postdoctoral researchers, shared testing areas, seminar rooms, and administration space. Where possible, representatives of AIPAH see the value in developing synergies with FPER, The Steadward Centre and other stakeholders. With the proposed adjacency to The Steadward Center, AIPAH has agreed that some spaces could be shared to maximize utilization of space.

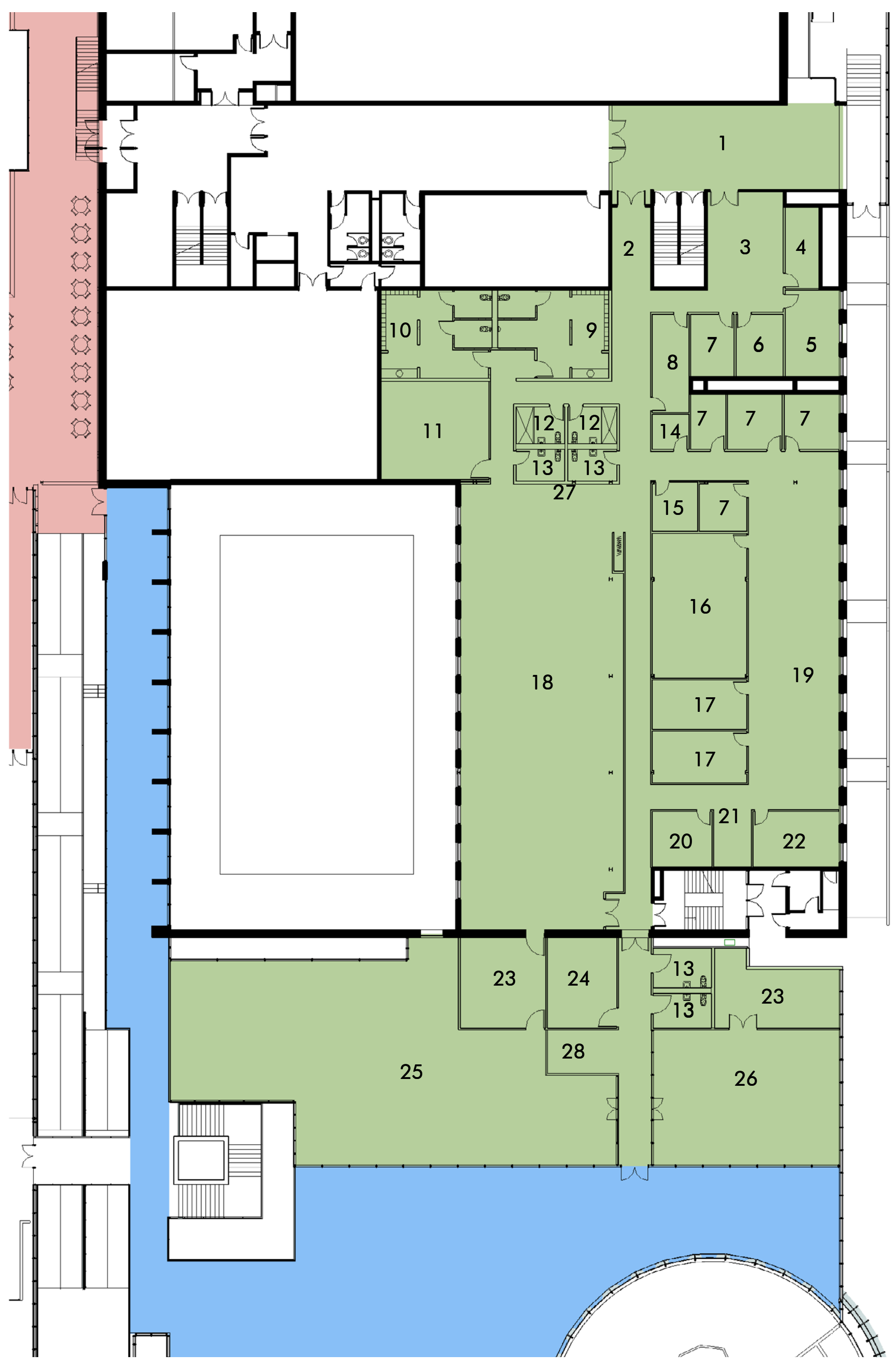
Three options were explored during schematic design. Option 1 located the enclosed offices on the perimeter of the space with the workstations infilling the central area. Option 2 accommodated all of the workstations on the exterior walls with the enclosed office creating an internal row that bisected the space in the north-south direction. Option 3, which is shown within that report, is a hybrid of the first two options.

A definitive option was not selected by this group. Further exploration and feedback from this group is required in order to determine the appropriate balance of open space vs. private space and how the users function to complete their work.

The Edmonton Clinic Health Academy was toured as a current precedent for integration of open work spaces and enclosed offices. It is common practice to situate workstations on the perimeter of the space in an effort to maximize daylight for all users. Demountable partition walls were implemented for the enclosed offices to ensure long term flexibility and adaptability. Windows within these partitions allow daylight to enter the enclosed offices while at the same time provide an optimal level of privacy and security. A sound transmission rating can be achieved equally with these demountable partition as with standard steel stud and gypsum boards partitions. It should be noted that it is typical for these walls to extend to the underside of the suspended acoustic ceiling (t-bar) and not to the underside of the structure.

3.2 STEADWARD CENTRE AREA			
Room Name	Schematic Design Gross Area	Functional Master Plan Program Area *	Comments
LEVEL 2			
2 HOTELING WORKSTATIONS	10.1 m²	7.8 m²	
CIRCULATION	249.2 m²	0.0 m²	23% circulation allowance included within each program area
COAT STORAGE	9.2 m²	9.1 m²	
COPY ROOM	16.8 m²	15.6 m²	
EQUIPMENT STORAGE AND REPAIR	74.1 m²	123.5 m²	
EXECUTIVE DIRECTOR OFFICE	14.0 m²	18.2 m²	
FAMILY WAITING AREA	14.2 m²	0.0 m²	
FILE STORAGE	13.3 m²	19.5 m²	
FITNESS CENTRE	315.6 m²	455.0 m²	
FREE TO BE ME	449.3 m²	520.0 m²	
GRADUATE LAB	15.7 m²	19.5 m²	
INTERVIEW ROOM	22.9 m²	26.0 m²	
KITCHENETTE	10.5 m²	15.6 m²	
LOCKER ROOM - MENS	40.4 m²	39.0 m²	
LOCKER ROOM - WOMENS	45.3 m²	39.0 m²	
MEETING ROOM	23.3 m²	26.0 m²	
OFFICES	53.4 m²	42.9 m²	
PHYSICAL ASSESSMENT LAB	49.1 m²	52.0 m²	replaces FES Multi-Purpose / Rehab Lab
PRIVACY ROOM (OFFICE)	9.4 m²	9.8 m²	
PROGRAM PREP / VOLUNTEER LOUNGE / KITCHENETTE	29.6 m²	0.0 m²	client requested
PSYCHOLOGICAL SOCIAL LAB	44.1 m²	52.0 m²	
PUBLIC LOBBY SPACE	89.6 m²	130.0 m²	
RECEPTION	17.8 m²	15.6 m²	
SEMINAR / CONFERENCE ROOM	61.8 m²	78.0 m²	shared with AIPAH
SERVER ROOM	6.2 m²	6.5 m²	shared with AIPAH
WASHROOMS	56.6 m²	78.0 m²	6 provided, 2 with showers
WORKSTATIONS	105.2 m²	117.0 m²	18 workstations
	1846.6 m²	1915.6 m²	
Grand total	1846.6 m²	1915.6 m²	

* Gross up factors of 23% for circulation & walls and 7% for mechanical, electrical & structural allowance (30% total) are included in Program Area values



STEADWARD CENTRE AREA - LEVEL 2

SPACE LEGEND

1 PUBLIC LOBBY SPACE
2 MEMBER ENTRANCE
3 RECEPTION
4 FILE STORAGE
5 INTERVIEW ROOM
6 EXECUTIVE DIRECTOR OFFICE
7 OFFICE
8 COPY ROOM
9 LOCKER/WASHROOMS - MENS
10 LOCKER/WASHROOMS - WOMENS
11 PHYSICAL ASSESSMENT LAB
12 WASHROOM W/ SHOWER
13 WASHROOM
14 SERVER ROOM
15 KITCHENETTE
16 CONFERENCE ROOM (SHARED WITL AIPAH)
17 PSYCH / SOCIAL LAB
18 FITNESS CENTRE (TESTING AND TRAINING)
19 OPEN WORKSTATIONS
20 GRADUATE LAB
21 HOTELLING WORKSTATIONS
22 MEETING ROOM
23 EQUIPMENT STORAGE AND REPAIR
24 PROGRAM PREP. AREA / VOLUNTEER MEETING / KITCHENETTE
25 FREE TO BE ME PROGRAM AREA
26 FREE TO BE ME PROGRAM AREA (TEEN)
27 COAT STORAGE
28 FAMILY WAITING AREA

The Steadward Centre

- Functional Program GFA for The Steadward Centre
  1,916 square metres (20,619 square feet)

- Current Design GFA for The Steadward Centre
  1,847 square metres (19,877 square feet)

The Steadward Centre program primarily accommodates spaces that support physical activity and sport programs for people with disabilities. In conjunction with providing programs for disabled adults and children the Centre also conducts research in this area. The program includes fitness space, locker rooms, administrative space, interview rooms and testing space. The Steadward Centre stakeholders indicated the importance of easy access to the centre for athletes and care givers as well as street presence/address.

In addition to fitness and lab space The Steadward Centre includes administrative space to accommodate academics, staff and graduate students.

Information Sessions have been held with Steadward Clients, Staff and the Board of Directors. The design has received favorable comments and applicable feedback.

3.3 RENEWED SPACE			
Room Name	Schematic Design Gross Area	Functional Master Plan Program Area *	Comments
LEVEL 1			
ADDITION TO WEST	0.0 m²	820.0 m²	squash courts addition not included/required
LOCKER ROOMS	2271.1 m²	1280.0 m²	
RAQUETBALL	221.3 m²	817.0 m²	2 courts
	2492.4 m²	2917.0 m²	
LEVEL 2			
SQUASH COURTS	722.2 m²	942.0 m²	8 courts
	722.2 m²	942.0 m²	
Grand total	3214.6 m²	3859.0 m²	

* There are no gross up factors applied to these Program Area values as spaces are existing (no gross up amount is required for Addition to West Program Area)

3.4 RENEWED - ADDITIONAL SPACE			
Room Name	Schematic Design Gross Area	Functional Master Plan Program Area	Comments
LEVEL 1			
ASDC/ATHLETE HEALTH PROGRAM/ATHLETIC THERAPY	308.6 m²	0.0 m²	current Glen Sather Clinic
EQUIPMENT/STAFF	191.1 m²	0.0 m²	point of entry move
FACULTY STORAGE	121.9 m²	0.0 m²	
MEETING ROOM	38.5 m²	0.0 m²	replaces W1-14
REC. REGISTRATION / INFORMATION	55.6 m²	0.0 m²	displaced by locker expansion
UNIVERSAL CHANGE ROOMS	38.6 m²	0.0 m²	
VARSITY TRAINING ROOM	108.7 m²	0.0 m²	current reving room
	863.1 m²	0.0 m²	
LEVEL 2			
CLASSROOM/LAB	177.6 m²	0.0 m²	repurpose current Steadward Centre
FACULTY RECEPTION	48.3 m²	0.0 m²	
HALL OF FAME	179.0 m²	0.0 m²	
MEETING ROOM	70.5 m²	0.0 m²	repurpose current Steadward Centre
	475.5 m²	0.0 m²	
LEVEL 3			
PHYS ED LOUNGE	257.0 m²	0.0 m²	
	257.0 m²	0.0 m²	
Grand total	1595.6 m²	0.0 m²	

Renewed Areas

- Functional Program GFA for Renewed Areas
  3,859 square metres (41,538 square feet)

- Current Design GFA for Renewed Areas
  3,215 square metres (34,602 square feet)

The renewed areas include a major renewal and addition to the Men's Locker Room to accommodate a new Women's Locker Room, providing women direct access to the west pool. The planning will expand into the West Gym (existing fitness facility) to increase the locker room area and increase the locker capacity by 25%.

With the expansion of the Men's Locker Room into the existing fitness centre the design proposes a new floor (at Level 2) be constructed in the West Gym (existing fitness Centre) to accommodate new squash courts being displaced by The Steadward Centre and the AIPAH. The area will accommodate eight squash courts. The existing two racquet ball courts in the V V C currently being used as a weight room and dance studio will be renovated back into racquet ball courts.

The relocation of The Steadward Centre from the V V C West Wing to the East Wing frees up an area that will become renewed space for use by the faculty. Other miscellaneous areas will be renewed due to Faculty space and Phys Ed Student space relocating as a result of the PAW Centre Project.

Renewed Areas - Additional

- Functional Program GFA for Renewed Areas
  0 square metres (0 square feet)

- Current Design GFA for Renewed Areas
  1,596 square metres (17,175 square feet)

It was found during the design that with the insertion of the PAW Centre program some additional areas of the existing V V C, East Wing and Universiade Pavilion would need to be renewed for decanting Faculty program dislocated by the design.

This includes:

- the renovation of the current Glen Sather Clinic to ASDC, Athlete Health Program, Athlete Therapy
- relocation of the Activity Registration Zone and Intramural Registration Office to the central lower concourse
- relocation of current meeting room that is located between the West Building with University Hall,
- relocation of Varsity Training Room to accommodate Fitness Centre Space,
- renovation of existing Steadward Centre to Classroom/Labs,
- renovation to provide universal change rooms for users of pool facilities,
- addition of Hall of Fame
- relocation of Physical Education Student Lounge

See chart on opposite page for full extent of areas affected.

Service

- Functional Program GFA for Renewed Areas
  0 square metres (0 square feet)

- Current Design GFA for Renewed Areas
  408 square metres (4,386 square feet)

Service space was added to the program for the mechanical penthouse and wet mechanical room to accommodate the systems for the Fitness Centre, Climbing Centre, Concourse / Social Street and some existing areas that need additional air exchanges to meet the current Alberta Building Code.

2.5 ARCHITECTURAL OUTLINE SPECIFICATIONS

The Architectural Outline Specifications for the PAW Centre is included on the following pages.

Preliminary Project Description (PPD)

INTRODUCTION

10	**PROJECT DESCRIPTION**	
1010	Project Summary	PAW Centre addition and renovation to existing buildings at the University of Alberta main campus. Located at the intersection of 87 Avenue and 114 Street. New fitness centre and climbing centre.
1030	Project Criteria	Comply with the University of Alberta - Universal Design Guide. Allow universal access regardless of ability for entire site and building. Site planning must accommodate persons with mobility and sight impairment without the need of assistance on primary routes.
1030.50	Sustainable Design Requirements	LEED-NC Silver, CaGBC.
1030.56	Indoor Air Quality Requirements	Construction air quality management
1040	Existing Conditions	Existing buildings and site paving.
1050	Owner's Work	Hazardous materials removal. Commercial kitchen equipment. FFE products (Demountable partitions, laboratory benches, tables and chairs.)
20	**OWNER DEVELOPMENT**	
2030.20	Professional Design Services	Architect – Group2 Architecture Engineering Ltd. Structural Engineer – Stantec Mechanical Engineer – Hemisphere Engineering Ltd. Electrical Engineer - AECOM Landscape Consultant – Thirdstone Inc. Civil Engineer – Williams Engineering Ltd. Code Consultant – Larden MuniakConsulting Inc. Elevator Consultant – Vertex

2030.30	Other Consultants	Surveyors – Focus Corporation Geotechnical Engineers – Thurber Engineering Ltd. Commissioning Agents – TBD Door Hardware Consultant - UofA Security Consultant - UofA Food Service Consultant - TBD
2030.50	Special Inspectors	Building envelope testing
2050.30	Relocations	Utility shutdowns coordinated by the Project Manager, Planning and Project Delivery, who directs the utility shutdown request to the Department of Facilities Management. Facilities Management notifies parties involved and obtaining clearances to proceed. Advance notice of at least 72 hours to the Project Manager is required. Should the shutdown involve asbestos, Bio-Hazard or Radiation area, the Project Manager will co-ordinate the shutdown request with the Office of Environmental Health and Safety.
30	**PROCUREMENT REQUIREMENTS**	
3010.10	Project Delivery Methods	Design – Bid – Build with University of Alberta contract.
3010.50	Methods of Payment	Stipulated Sum.
3040.10	Preliminary Schedules	Phased construction to allow partial owner use of buildings.

ELEMENT A
SUBSTRUCTURE

A10	**FOUNDATIONS**	
A1010	Standard Foundations	No driven or compacted piles. Perimeter below grade – RSI 2.1 minimum.
A1020	Special Foundations	
A20	**SUBGRADE ENCLOSURES**	
A2010	Walls for Subgrade Enclosures	
A40	**SLABS-ON-GRADE**	
B4010	Standard Slabs-On-Grade	
A60	**WATER AND GAS MITIGATION**	
A6010	Building Subdrainage	
A90	**SUBSTRUCTURE RELATED ACTIVITIES**	
A9010	Substructure Excavation	
A9020	Substructure Dewatering	
A9030	Excavation Support	

ELEMENT B
SHELL

B10	**SUPERSTRUCTURE**	
B1010	Floor Construction	
B1030	Roof Construction	No ponding for stormwater management on roofs. Roofs - RSI 5.8 minimum
B1030	Stairs	Clear glass panels at exterior walls.
B20	**EXTERIOR VERTICAL ENCLOSURES**	
B2010	Exterior Walls	Exterior cladding covering an air space pressure equalized with the exterior. An adhered air sealing component to the exterior of structural frame and structural infill. The air sealing component in combination with the underlying structural elements forms the air barrier system. Insulation in direct and firm contact with the air barrier. Mechanically secure insulation. Inspection of substrate materials and surfaces before application of air, vapour, and thermal barrier; sprayed fireproofing, dampproofing, waterproofing, roofing systems, and other special applications. After completion of the air, vapour, and thermal barrier work, a thermographic infrared scan will be performed of the integrity of barriers. Exterior walls - RSI 3.4 minimum. RSI 0.88 minimum insulation between exterior building cladding and its structural support member. RSI 3.4 to outside of building structural components, including columns, beams, lintels and purlins. Insulation at the exterior of structural elements, completely enclosing non-cladding envelope components. Impact protection 2.4 m minimum above grade.

B2010.40	Fabricated Exterior Wall Assemblies	Aluminum curtain wall system, double wall system.
B2020	Exterior Windows	Window frame construction that will prevent condensation from forming on the interior frame face at the interior at the 2.5% January design temperature. Design window assemblies as pressure equalized, rainscreen systems with the main mass of the frame located to the interior of the thermal break. Do not use the frame to span the cavity between the inner wythe and the cladding. Window and interior surrounds allow uniform air movement across glass and frame. Double glazed low E glass. Hermetically sealed glass units for windows, glazed frames, curtain walls, doors, etc., minimum 25 mm total thickness with metal protective edging, warranted for ten years from interpane dusting and misting. No wood, fiberglass, nor plastic windows.
B2050.10	Exterior Entrance Doors	Clear glazed panels into access and exit doors at entrances and stairwells. Pressed steel or extruded aluminium. No wood doors. Aluminum doorframes thermally broken. Pressed steel doorframes thermally broken and insulated. Aluminum doors fully glazed and thermally broken. Hollow metal doors insulated at exit/entrances with a sidelite viewable to a person in a wheelchair. Glazed or with sidelite. Automatic sliding doors at high volume areas.

B2050.90	Exterior Doors Supplementary Components	To be completed by University of Alberta.
B2070	Exterior Louvers and Vents	
B2080.30	Exterior Opening Protection Devices	Perforated, sun shielding.
B2090	Exterior Wall Specialties	References, selection of materials and quality of work standards complying with MPI "Architectural Specification Manual". Exterior painting guaranteed by "Accredited Quality Assurance" Association 2-Year in accordance with MPI Architectural Painting Specification Manual, 2 years.
B30	**EXTERIOR HORIZONTAL ENCLOSURES**	
B3010.50	Low-Slope Roofing	Fully adhered, SBS membrane. Sloped to internal drains. ARCA five year warranty certificate of Assurance. Roof inspections by the manufacturer's technical representative and a Certified Roofing Inspector. Solar Reflectance Index meeting LEED requirements. 200 mm curb minimum above roof membrane. 1.0 m clearance at perimeter of roof mounted equipment. Provide access.
B3020	Roof Appurtenances	All roof drainage through the interior tied to the storm sewer system. Fall Arrest: Anchors at perimeter of roof assembles.
B3040	Traffic Bearing Horizontal Enclosures	Roof Walkways: From roof access points to equipment.

B3060	Horizontal Openings.	Access to each roof level from stair wells. Roof access to roof mounted significant equipment from stairs. Ships ladder access at minor equipment. No vertical ladders. Roof hatches: RSI 3.5. One-hand use latches. Telescoping safety post.
B3060.10	Roof Windows and Skylights	Glazed.

ELEMENT C
INTERIORS

C10	**INTERIOR CONSTRUCTION**	
C1010	Interior Partitions	General office and small meeting rooms, STC 40 Executive offices, large conference rooms, STC 45 Therapy rooms, lecture halls, STC 50+ STC 50 partitions to u/s structure Abuse resistant gypsum board at public corridors, lounges, entry vestibules, and lobbies. Water resistant gypsum backing board in light moisture exposure areas. Water resistant gypsum sheathing board at high moisture exposure areas. Gypsum board ceilings with severe lighting areas finished to AWCC level 5 skim coat. 92 mm metal studs minimum, with blocking at 800 and 1800 mm AFF. Concrete block construction in locker rooms.
C1010.50	Interior Operable Partitions	Between multi-purpose rooms, overhead supported, and automatic floor and wall seals.

C1020	Interior Windows	Welded steel frames to CSDMA recommendations. Full height frames with 150 mm minimum bottom sill. Dry glaze.
C1030	Interior Doors	Pressed steel or plastic laminate clad – offices.
C1070	Suspended Ceiling Construction	White ceiling tile and suspension system.
C1090	Interior Specialties	Whiteboards: 0.76 mm porcelain enameled steel with clear anodized aluminum frame.
C1090.25	Compartments and Cubicles	Toilet Compartments: Ceiling hung. Shower Compartments: Overhead braced.
C1090.35	Wall and Door Protection	Stainless steel.
C1090.40	Toilet, Bath, and Laundry Accessories	Toilet Tissue Dispenser: Supplied by University, installed by Contractor. Paper Towel Dispenser: Supplied by University, installed by Contractor. Soap Dispenser: Supplied by University, installed by Contractor. Feminine Napkin Disposal Bin. Grab Bars: Stainless steel with peened grip. No Feminine napkin dispenser, condom vendor, nor deodorant block holder.
C1090.70	Storage Specialties	Lockers. Locker room benches, non-fixed.
C20	**INTERIOR FINISHES**	
C2010	Wall Finishes	Low VOC finishes. Meeting LEED requirements. Compliant with AWCC recommendations. Compliant with TTMAC recommendations. Durable to 1200 mm AFF minimum. Architectural concrete.

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C2030	Flooring	Low-maintenance finishes. Non-slip at vestibules and ramps. Polished concrete floors in some locations.
C2030.20	Tile Flooring	Tile flooring installed to TTMAC recommendations. Wet areas with sheet-type waterproof membrane. Epoxy grout in wet areas.
C2030.50	Resilient Flooring	Linoleum.
C2030.75	Carpeting	Carpet tile, compliant with CRI Plus.
C2030.80	Athletic Flooring	Maple. Poured-in-place rubber.
C2040	Stair Finishes	Non-slip finish. Contrasting colour or texture at vertical dimension changes. Durable wall finishes.
C2050	Ceiling Finishes	Gypsum board ceilings with severe lighting areas finished to AWCC level 5 skim coat. Low VOC finishes. Meeting LEED requirements.

ELEMENT D
SERVICES

D10	**CONVEYING**	
D1010.10	Elevators	Meeting CSA B44. No manufactured proprietary control equipment. Durable interior finishes. One year maintenance included. Manufactured by one of the following: - KONE Elevator Co. - Otis Canada Inc. - Schindler Elevator Corporation - Thyssen Krupp Elevator Co. Passenger Elevators: One elevator with 2 stops, one with 4 stops. 1135 kg minimum capacity. 2590 mm clear cab height. Centre opening doors. Freight elevator: One elevator with 2 stops.
D20	**PLUMBING**	
D2010	Domestic Water Distribution	
D2030	Building Support Plumbing Systems	
D2050	General Service Compressed-Air	
D2060	Process Support Plumbing Systems	
D30	**HEATING, VENTILATION, AND AIR CONDITIONING (HVAC)**	
D3010	Facility Fuel Systems	
D3020	Heating Systems	Meet National Energy Code for Canada, latest edition. Meet ASHRAE 90.1. 25 year equipment life span.
D3030	Cooling Systems	
D3050	Facility HVAC Distribution Systems	

D3060	Ventilation	
D40	**FIRE PROTECTION**	
D4010	Fire Suppression	
D4030	Fire Protection Specialties	Fire suppression cabinets.
D50	**ELECTRICAL**	
D5020	Electrical Service and Distribution	
D5030	General Purpose Electrical Power	
D5040	Lighting	
D5080	Miscellaneous Electrical Systems	
D60	**COMMUNICATIONS**	
D6010	Data Communications	
D6020	Voice Communications	
D6030	Audio-Video Communication	
D6060	Distributed Communications and Monitoring	
D70	**ELECTRONIC SAFETY AND SECURITY**	
D7010	Access Control and Intrusion Detection	
D7030	Electronic Surveillance	
D7050	Detection and Alarm	
D7070	Electronic Monitoring and Control	
D80	**INTEGRATED AUTOMATION**	
D8010	Integrated Automation Facility Controls	

ELEMENT E
EQUIPMENT AND FURNISHINGS

E10	**EQUIPMENT**	
E1010	Vehicle and Pedestrian Equipment	
E1030	Commercial Equipment	
E1040	Institutional Equipment	Projection screens.
E1060	Residential Equipment	
E1070	Entertainment and Recreational Equipment	
E1090	Other Equipment	
E20	**FURNISHINGS**	
E2010	Fixed Furnishings	
E2010.30	Casework	Modular design.
E2050	Movable Furnishings	

ELEMENT F
SPECIAL CONSTRUCTION AND DEMOLITION

F10	**SPECIAL CONSTRUCTION**	
F1060	Athletic and Recreational Special Construction	Squash and racquetball finishes. Climbing wall structure and surfaces.
F30	**DEMOLITION**	
F3030	Selective Demolition	Removal of selected building components. High percentage demolition waste diverted from landfill. Existing mature trees protected during construction.

ELEMENT G
SITEWORK

G10	**SITE PREPARATION**	
G1010	Site Clearing	
G1020	Site Elements Demolition	Concrete plaza demolition.
G1030	Site Element Relocations	
G1050	Site Remediation	
G1070	Site Earthwork	
G20	**SITE IMPROVEMENTS**	
G2020	Parking Lots	
G2030	Pedestrian Plazas and Walkways	Comply with accessibility guidelines. Curbcuts complying with accessibility guidelines.
G2050	Athletic, Recreational, and Playfield Areas	
G2060	Site Development	Bicycle racks. Trash and litter receptacles.
G2080	Landscaping	Native plant species. Conforming to the horticultural standards of the Canadian Nursery Trades Association. Seed: Canada No.1 Lawn Grass Mixture. Sod conforming to Nursery Sod Growers Association.
G30	**LIQUID AND GAS SITE UTILITIES**	
G3010	Water Utilities	Piping complying with ANSI B31.3. Domestic water service through utility corridor. Fire Hydrants: Canada value century.

G3020	Sanitary Sewerage Utilities	Tie-ins with existing system approved by University Utilities Division. Manholes: 30m or less from building. External drop-type.
G3030	Storm Drainage Utilities	Tie-ins with existing system approved by University Utilities Division. Manholes: 30m or less from building. External drop-type.
G40	**ELECTRICAL SITE IMPROVEMENTS**	
G4010	Site Electric Distribution Systems	
G4050	Site Lighting	Pole mounted lights complying with University of Alberta guidelines.
G50	**SITE COMMUNICATIONS**	
G5010	Site Communications Systems	
G90	**MISCELLANEOUS SITE CONSTRUCTION**	
G9010	Tunnels	Utility Corridor: Designed with a life expectancy of 75 years minimum, for durability and service pipe sizing.

ELEMENT Z
GENERAL

Z10	**GENERAL REQUIREMENTS**	
1010	**Project Summary**	PAW Centre addition and renovation to existing buildings at the University of Alberta main campus. Located at the intersection of 87 Avenue and 114 Street.
Z1010.50	Sustainable Design Reporting	Complying with LEED-NC requirements.
Z1050	Temporary Facilities and Controls	Temporary power provided by University of Alberta. Temporary barricades around construction site.
Z1090.10	Commissioning	The University will retain an external Commissioning Manager. Commissioning Manager will work with University and Design Team to develop a commissioning program that is customized to the specific needs of the project, which will be lead, by Commissioning Manager. The number of third party testing agencies required is dependent on the technical nature of the project. The Design Team will outline system categories in the systems matrix for the University to fill in their anticipated levels of involvement.

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3.0 SUSTAINABLE / LEED® STRATEGIES

One of the major goals defined for the Physical Activity and Wellness Centre (PAW) at the University of Alberta is to use LEED® criteria to design sustainable, efficient, and comfortable spaces. The LEED® (Leadership in Energy and Environmental Design) building rating system is a third-party certification program that evaluates a project and its impact on the environment and health of the occupants based on a number of credits in six categories. These categories currently include the following:

- Sustainable Sites
- Water Efficiency
- Energy & Atmosphere
- Materials & Resources
- Indoor Environmental Quality
- Innovation & Design Process

Designing to LEED® standards benefits the environment by reducing negative impacts associated with construction and operation of the building, provides economic benefits by decreasing operational costs, and increases the health and safety of building occupants by specifying non-toxic and healthy materials. Other benefits include enhancing asset value, reduced liability risk, improved risk management, improved productivity, and reduced absenteeism and turnover.

Although not required, LEED® Silver certification for the PAW centre has been targeted for this project and is in alignment with the university's commitment towards sustainable design and operations. If a higher number of points are possible within the project parameters LEED® Gold may be possible. The latest version of the rating system is LEED 2009 for New Construction and Major Renovations. A minimum of 50 points are currently required to achieve LEED® Silver, however strategies have been identified in each of the categories listed above that will target a credit total of 61 for the PAW Project. It is often necessary to aim for a higher point target than the minimum LEED® Silver requirement in order to guard against any unforeseen circumstances where not all points are achieved. This can occur due to budget constraints, schedule, availability of products, etc. The PAW Centre, will nevertheless be seen as a high-performance green building and an excellent example of sustainable design.

Highlighted strategies include:

- Natural daylight to create a healthier environment for facility occupants
- Use of natural, recycled and low-emitting healthy materials for building finishes
- Integration of high-albedo roofing materials to reduce heat-island effects
- Control of solar loads through efficient shading and glazing
- Interior lighting will be primarily controlled via occupancy sensors and low voltage switching to enable adjustable controls to suit task and desired lighting levels with connection to timer control through the low voltage lighting hardware, with the exception of service rooms.
- Exterior lighting will be chosen to be "Dark Sky Compliant" to minimize upward light glare.
- Recycled content will be maximized in structural steel (up to 90% recycled content) and reinforcing steel (up to 99% recycled content).
- The use of high fly ash content in concrete members reduces the amount of Portland cement required and also diverts from the landfill a waste product of coal-fired power generation

During the next phase of design the project will be officially registered as a LEED® project with the Canada Green Building Council.

3.1 CHECKLIST

The following table represents the CaGBC LEED Checklist for 2009 - New Construction and Major Renovations.

LEED 2009 for New Construction and Major Renovations

Project Checklist

The University of Alberta - Physical Activity and Wellness (PAW) Centre

February 1 ,2011

Y	?	N			Points
20		6	**Sustainable Sites**		Possible Points: 26
Y			Prereq 1	Construction Activity Pollution Prevention	
1			Credit 1	Site Selection	1
5			Credit 2	Development Density and Community Connectivity	5
		1	Credit 3	Brownfield Redevelopment	1
6			Credit 4.1	Alternative Transportation—Public Transportation Access	6
1			Credit 4.2	Alternative Transportation—Bicycle Storage and Changing Rooms	1
		3	Credit 4.3	Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
2			Credit 4.4	Alternative Transportation—Parking Capacity	2
		1	Credit 5.1	Site Development—Protect or Restore Habitat	1
1			Credit 5.2	Site Development—Maximize Open Space	1
1			Credit 6.1	Stormwater Design—Quantity Control	1
1			Credit 6.2	Stormwater Design—Quality Control	1
1			Credit 7.1	Heat Island Effect—Non-roof	1
		1	Credit 7.2	Heat Island Effect—Roof	1
1			Credit 8	Light Pollution Reduction	1
10			**Water Efficiency**		Possible Points: 10
Y			Prereq 1	Water Use Reduction—20% Reduction	
4			Credit 1	Water Efficient Landscaping	2 to 4
2			Credit 2	Innovative Wastewater Technologies	2
4			Credit 3	Water Use Reduction	2 to 4
12	1	5	**Energy and Atmosphere**		Possible Points: 35
Y			Prereq 1	Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2	Minimum Energy Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
8			Credit 1	Optimize Energy Performance	1 to 19
	1		Credit 2	On-Site Renewable Energy	1 to 7
2			Credit 3	Enhanced Commissioning	2
2			Credit 4	Enhanced Refrigerant Management	2
		3	Credit 5	Measurement and Verification	3
		2	Credit 6	Green Power	2
6	5	3	**Materials and Resources**		Possible Points: 14
Y			Prereq 1	Storage and Collection of Recyclables	
1		2	Credit 1.1	Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		1	Credit 1.2	Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
2			Credit 2	Construction Waste Management	1 to 2
	2		Credit 3	Materials Reuse	1 to 2

Y	?	N			Points
			Materials and Resources, Continued		
1	1		Credit 4	Recycled Content	1 to 2
1	1		Credit 5	Regional Materials	1 to 2
	1		Credit 6	Rapidly Renewable Materials	1
1			Credit 7	Certified Wood	1
7	2	6	**Indoor Environmental Quality**		Possible Points: 15
Y			Prereq 1	Minimum Indoor Air Quality Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
		1	Credit 1	Outdoor Air Delivery Monitoring	1
	1		Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan—During Construction	1
1			Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1			Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1			Credit 4.3	Low-Emitting Materials—Flooring Systems	1
		1	Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
		1	Credit 5	Indoor Chemical and Pollutant Source Control	1
1			Credit 6.1	Controllability of Systems—Lighting	1
	1		Credit 6.2	Controllability of Systems—Thermal Comfort	1
1			Credit 7.1	Thermal Comfort—Design	1
		1	Credit 7.2	Thermal Comfort—Verification	1
		1	Credit 8.1	Daylight and Views—Daylight	1
		1	Credit 8.2	Daylight and Views—Views	1
6			**Innovation and Design Process**		Possible Points: 6
1			Credit 1.1	Innovation in Design: Exeptional Water Use Reduction	1
1			Credit 1.2	Innovation in Design: Exceptional Waste Water Reduction	1
1			Credit 1.3	Innovation in Design: Green Education	1
1			Credit 1.4	Innovation in Design: Green Housekeeping	1
1			Credit 1.5	Innovation in Design: Sustain. Sites: Exceptional Public Transit Access	1
1			Credit 2	LEED Accredited Professional	1
		4	**Regional Priority Credits**		Possible Points: 4
		1	Credit 1.1	Regional Priority: Specific Credit	1
		1	Credit 1.2	Regional Priority: Specific Credit	1
		1	Credit 1.3	Regional Priority: Specific Credit	1
		1	Credit 1.4	Regional Priority: Specific Credit	1
61	8	24	**Total**		Possible Points: 110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

3.2 REFERENCE GUIDE CREDIT SUMMARY

A summary of potential LEED credits intent, requirements, and strategies is included on the following pages. All the credits are shown for information. The cells that are shown in shaded grey are points that the design team considers unattainable, similarly the cells that are shown in shaded green are points that are *maybe* pursued during the development of the design.

CREDIT NO.	CREDIT NAME	OPTION	POSSIBLE PNTS	YES	MAYBE	NO	INTENT	REQUIREMENTS	PROPOSED STRATEGY/STATUS/COMMENTS
SUSTAINABLE SITES									
Prereq 1	Construction Activity Pollution Prevention						To reduce pollution from construction activities by controlling soil erosion, waterway sedimentation and airborne dust generation.	Create and implement an erosion and sedimentation control (ESC) plan for all construction activities associated with the project. The plan must conform to the erosion and sedimentation requirements of the 2003 U.S. EPA Construction General Permit OR local standards and codes, whichever is more stringent. The plan must describe the measures implemented to accomplish the following objectives: • To prevent loss of soil during construction by stormwater runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse. • To prevent sedimentation of storm sewer or receiving streams. • To prevent pollution of the air with dust and particulate matter. The U.S. EPA's construction general permit outlines the provisions necessary to comply with Phase I and Phase II of USA's National Pollutant Discharge Elimination System (NPDES) program. While the permit only applies to construction sites greater than 0.40 hectares (1 acre), the requirements are applied to all projects for the purposes of this prerequisite.	Civil to have draft of erosion and sedimentation control plan at end of Design Development. Owner occupied space. Controling access at all times during construction sequence.
SS1	Site Selection		1	1			To avoid the development of inappropriate sites and reduce the environmental impact from the location of a building on a site.	Do not develop buildings, hardscape, roads or parking areas on portions of sites that meet any of the following criteria: • Prime farmland (farm buildings are exempt from this requirement). • Previously undeveloped or graded land whose elevation is EITHER: • lower than 1.5 metres (5 feet) above the elevation of the 100-year flood plain, OR • lower than 0.9 metres (3 feet) above the elevation of the 200-year flood plain. • Ecologically sensitive land. • Land specifically identified as habitat for any species on federal, provincial, or territorial threatened or endangered lists. • Land within 30.5 metres (100 feet) of any wetlands or areas of special concern identified by federal, provincial, or local authorities, OR within setback distances from wetlands prescribed in federal, provincial, or local regulations and requirements, whichever are more stringent. • Previously undeveloped or graded land that is within 15.2 metres (50 feet) of a water body, defined as seas, lakes, rivers, streams and tributaries which support or could support fish, recreation or industrial use, consistent with federal, provincial, or local regulations and requirements. • Land that prior to acquisition for the project was public parkland, unless land of equal or greater value as parkland is accepted in trade by the public landowner (park authority projects are exempt).	During the site selection process, give preference to sites that do not include sensitive elements or restrictive land types. Select a suitable building location and design the building with a minimal footprint to minimize disruption of the environmentally sensitive areas identified above. Confirm campus wide criteria.
SS2	Development Density OR	Option 1	3				To channel development to urban areas with existing infrastructure, protect greenfields and preserve habitat and natural resources.	Construct or renovate a building on a previously developed or graded site, that conforms with a minimum development density of 13,800 square metres per hectare requirement (60,000 square feet per acre), AND select a site in a community with a minimum density of 13,800 square metres per hectare (60,000 square feet per acre net). The density calculation is based on a typical	Not Pursuing
	Community Connectivitly	Option 2	5				To channel development to urban areas with existing infrastructure, protect greenfields and preserve habitat and natural resources.	Construct or renovate a building on a site that meets the following criteria: • Is located on a previously developed site • Is within 800 metres (½ mile) of a residential area or neighbourhood with an average density of 25 units per hectare (10 units per acre net) (unless the project itself contains residential units meeting the density requirement) • Is within 800 metres (½ mile) of at least 10 basic services • Has pedestrian access between the building and the services.	Not Pursuing
	Community Connectivitly with Density	Optiion 3	5	5			To channel development to urban areas with existing infrastructure, protect greenfields and preserve habitat and natural resources.	Construct or renovate a building on a site that meets the following criteria: • Is located on a previously developed site • Meets the community connectivity requirements of Option 2 • Meets the minimum project site density requirement of 13,800 square metres per hectare (60,000 square feet per acre).	Calculation of Design required.
SS3	Brownfiled Redevelopment		1			1	To rehabilitate damaged sites where development is complicated by environmental contamination and to reduce pressure on undeveloped land.	Not Applicable	Not Pursuing
SS4.1	Alternative Transportation: Public Transportation Access	Option 1	6				To reduce pollution and land development impacts from automobile use.	OPTION 1. RAIL STATION PROXIMITY (6 points) Locate the project within 800 metres (½ mile) walking distance (measured from a main building entrance) of an existing or planned and funded commuter rail, light rail or subway station with frequent service.	

CREDIT NO.	CREDIT NAME	OPTION	POSSIBLE PNTS	YES	MAYBE	NO	INTENT	REQUIREMENTS	PROPOSED STRATEGY/STATUS/COMMENTS
		Option 2	6	6			To reduce pollution and land development impacts from automobile use.	OPTION 2. BUS STOP PROXIMITY (6 points) Locate the project within 400 metres (¼ mile) walking distance (measured from a main building entrance) of 1 or more stops for 2 or more public, campus, or private bus lines with frequent service usable by building occupants.	Perform a transportation survey of future building occupants to identify transportation needs. Site is in close proximity to bus loop (multiple lines).
		Option 3	3,6				To reduce pollution and land development impacts from automobile use.	OPTION 3. TRANSPORTATION DEMAND MANAGEMENT PLAN (3 or 6 points) Provide a Transportation Demand Management Plan (TDM) Strategy that results in a more efficient use of transportation resources, demonstrated through reduction of single occupant vehicle (SOV) trips by 25% (3 points) or 50% (6 points).	Carpooling strategy. Confirm scenario at U of A.
	Alternative Transportation: Bicycle Storage & Changing Rooms		1	1			To reduce pollution and land development impacts from automobile use.	CASE 1. FOR NON-RESIDENTIAL PROJECTS Provide secure and covered bicycle racks and/or storage within 183 metres (200 yards) of a building entrance for 5% or more of Full-Time Equivalent (FTE) occupants. Provide secure bicycle racks and/or storage within 183 metres (200 yards) of a building entrance for 5% or more of peak Transient Users. Provide shower and changing facilities in the building, or within 183 metres (200 yards) of a building entrance, for 0.5% of Full-Time Equivalent (FTE) occupants. CASE 2. FOR MULTI-UNIT RESIDENTIAL PROJECTS Provide covered storage facilities for securing bicycles for 15% or more of building occupants.	Determine Full Time Occupant Load.
SS4.3	Alternative Transportation: Low-Emitting and Fuel-Efficient Vehicles	Option 1,2,3	3			3	To reduce pollution and land development impacts from automobile use.	Provide low consumption, high efficiency hybrid or alternative fuel vehicles for 3% of FTE occupants, or install alternative-fuel refuelling station within 500m of site for 3% of total on-site parking capacity.	Not Pursuing
SS4.4	Alternative Transportation: Parking Capacity	Option 3	2	2			To reduce pollution and land development impacts from automobile use.	Provide no new parking. Do not exceed 3.5 spaces per 93 square metres (1000 square feet) of gross floor area. For projects with existing parking, provide preferred parking for carpools or vanpools for 5% (for New Construction) or 3% (for Core and Shell) of the total provided parking spaces.	Possible Vanpools (DATS) for the Steadward Centre.
SS5.1	Site Development: Protect and Restore Habitat		1			1	To conserve existing natural areas and restore damaged areas to provide habitat and promote biodiversity.	CASE 1. GREENFIELD SITES Limit all site disturbance to the following parameters: • 12 metres (40 feet) beyond the building perimeter; • 3 metres (10 feet) beyond surface walkways, patios, surface parking and utilities less than 300 mm (12 inches) in diameter; • 4.5 metres (15 feet) beyond primary roadway curbs and main utility branch trenches; • 7.5 metres (25 feet) beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities and playing fields) that require additional staging areas to limit compaction in the constructed area. CASE 2. PREVIOUSLY DEVELOPED AREAS OR GRADED SITES Restore or protect a minimum 50% of the site area (excluding the building footprint) or 20% of the total site area (including building footprint), whichever is greater, with native or adapted vegetation. Projects earning 5 points under SS Credit 2: Development Density and Community Connectivity may include vegetated roof surface in this calculation if the plants are native or adapted, provide habitat, and promote biodiversity.	Survey greenfield sites to identify site elements and adopt a master plan for developing the project site. Carefully site the building to minimize disruption to existing ecosystems and design the building to minimize its footprint. Strategies include stacking the building program, tuck-under parking and sharing parking facilities with neighbours. Establish clearly-marked construction boundaries to minimize disturbance of the existing site and restore previously degraded areas to their natural state. For previously developed sites, use local and regional governmental agencies, consultants, educational facilities and native plant societies as resources for the selection of appropriate native or adapted plants. Prohibit plants listed as invasive or noxious weed species. Once established, native/adapted plants require minimal or no irrigation; do not require active maintenance such as mowing or chemical inputs such as fertilizers, pesticides or herbicides; and provide habitat value and promote biodiversity through avoidance of monoculture plantings.
SS5.2	Site Development: Maximize Open Space		1	1			To promote biodiversity by providing a high ratio of open space to development footprint.	CASE 1. SITES WITH LOCAL ZONING OPEN SPACE REQUIREMENTS Reduce the development footprint and/or provide vegetated open space within the project boundary such that the amount of open space exceeds local zoning requirements by 25%. CASE 2. SITES WITH NO LOCAL ZONING REQUIREMENTS (e.g., some university campuses, military bases) Provide vegetated open space area adjacent to the building that is equal in area to the building footprint. CASE 3. SITES WITH LOCAL ZONING BUT NO OPEN SPACE REQUIREMENTS Provide vegetated open space equal to 20% of the project's site area.	Perform a site survey to identify site elements and adopt a master plan for developing the project site. Select a suitable building location and design the building footprint to minimize site disruption. Strategies include stacking the building program, tuck-under parking and sharing parking facilities with neighbours to maximize the amount of open space on the site. Confirm irrigation on east field (pending project footprint definition).

CREDIT NO.	CREDIT NAME	OPTION	POSSIBLE PNTS	YES	MAYBE	NO	INTENT	REQUIREMENTS	PROPOSED STRATEGY/STATUS/COMMENTS
SS6.1	Stormwater Design: Quantity Control		1	1			To limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff and eliminating contaminants.	CASE 1. SITES WITH EXISTING IMPERVIOUSNESS 50% OR LESS OPTION 1 Implement a stormwater management plan that prevents the post-development peak discharge rate and quantity from exceeding the pre-development peak discharge rate and quantity for the 1 and 2-year 24-hour design storms. OR OPTION 2 Implement a stormwater management plan that protects receiving waterways from excessive erosion by implementing velocity and quantity control strategies. CASE 2. SITES WITH EXISTING IMPERVIOUSNESS GREATER THAN 50% Implement a stormwater management plan that results in a 25% decrease in the rate and volume of stormwater runoff from the 2-year 24-hour design storms.	Design the project site to maintain natural stormwater flows by promoting infiltration. Specify vegetated roofs, pervious paving and other measures to minimize impervious surfaces. Reuse stormwater for non-potable uses such as landscape irrigation, toilet and urinal flushing, and custodial uses
SS6.2	Stormwater Design: Quality Control		1	1			To limit disruption and pollution of natural water flows by managing stormwater runoff.	Implement a stormwater management plan that reduces impervious cover, promotes infiltration and captures and treats the stormwater runoff from 90% of the average annual rainfall using acceptable best management practices (BMPs). BMPs used to treat runoff must be capable of removing 80% of the average annual post-development total suspended solids (TSS) load. BMPs are considered to meet these criteria if they are designed in accordance with standards and specifications from a provincial, territorial, or local program that has adopted these performance standards. Implement a management plan to minimize pollution and eutrophication of waterways from excess nutrient pollutants such as nitrogen and phosphorus, often found in cleaning agents and fertilizers.	Use alternative surfaces (e.g., vegetated roofs, pervious pavement, grid pavers) and non-structural techniques (e.g., rain gardens, vegetated swales, disconnection of imperviousness, rainwater recycling) to reduce mperviousness and promote infiltration and thereby reduce pollutant loadings. Use sustainable design strategies (e.g., low-impact development, environmentally sensitive design) to create integrated natural and mechanical treatment systems such as constructed wetlands, vegetated filters and open channels to treat stormwater runoff.
SS7.1	Heat Island Effect: Non-roof		1	1			To reduce heat islands to minimize impact on microclimates and human and wildlife habitats.	CASE 1. ALL PROJECTS OPTION 1 Use any combination of the following strategies for 50% of the site hardscape (including roads, sidewalks, courtyards and parking lots): • Provide shade from existing tree canopy or within 5 years of landscape installation; landscaping (trees) must be in place at the time of occupancy. • Provide shade from structures covered by solar panels that produce energy used to offset some non-renewable resource use. • Provide shade from architectural devices or structures that have a solar reflectance index (SRI) of at least 29. • Use hardscape materials with an SRI of at least 29. • Use an open-grid pavement system (at least 50% pervious). OR OPTION 2 Place a minimum of 50% of parking spaces under cover. Any roof used to shade or cover parking must have an SRI of at least 29, be a vegetated green roof, or be covered by solar panels that produce energy used to offset some non-renewable resource use.	Employ strategies, materials and landscaping techniques that reduce the heat absorption of exterior materials. Use shade (calculated on June 21, noon solar time) from native or adapted trees and large shrubs, vegetated trellises or other exterior structures supporting vegetation. Consider using new coatings and integral colorants for asphalt to achieve light-coloured surfaces instead of blacktop. Position photovoltaic cells to shade impervious surfaces. Consider replacing constructed surfaces (e.g., roof, roads, sidewalks, etc.) with vegetated surfaces such as vegetated roofs and open grid paving or specify high-albedo materials, such as concrete, to reduce heat absorption.
SS7.2	Heat Island Effect: Roof		1			1	To reduce heat islands to minimize impact on microclimates and human and wildlife habitats.	OPTION 1 Use roofing materials with a solar reflectance index (SRI) equal to or greater than the values in the table below for a minimum of 75% of the roof surface. OR OPTION 2 Install a vegetated roof for at least 50% of the roof area. OR OPTION 3 Install high-albedo and vegetated roof surfaces that, in combination, meet the following the criteria.	Consider installing high-albedo and vegetated roofs to reduce heat absorption. See the LEED Canada Reference Guide for Green Building Design and Construction for default values.
SS8	Light Pollution Reduction		1	1			To minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction and reduce development impact from lighting on nocturnal environments.	OPTION 1 Reduce the input power (by automatic device) of all non-emergency interior luminaires with a direct line of sight to any openings in the envelope (translucent or transparent) by at least 50% between the hours of 11 p.m. and 5 a.m. After-hours override may be provided by a manual or occupant-sensing device provided the override lasts no more than 30 minutes. OR OPTION 2 All openings in the envelope (translucent or transparent) with a direct line of sight to any non-emergency luminaires must have shielding (controlled/closed by automatic device for a resultant transmittance of less than 10% between the hours of 11 p.m. and 5 a.m.)	Adopt site lighting criteria to maintain safe light levels while avoiding off-site lighting and night sky pollution. Minimize site lighting where possible, and use computer software to model the site lighting. Technologies to reduce light pollution include full cutoff luminaires, low-reflectance surfaces and low-angle spotlights.
	Subtotal Points:		**26**	**20**	**0**	**6**			

CREDIT NO.	CREDIT NAME	OPTION	POSSIBLE PNTS	YES	MAYBE	NO	INTENT	REQUIREMENTS	PROPOSED STRATEGY/STATUS/COMMENTS
WATER EFFICIENCY									
Prereq 1	Water Use Reduction						To increase water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.	Employ strategies that in aggregate use 20% less water than the water use baseline calculated for the building (not including irrigation). Calculate the baseline according to the commercial and/or residential baselines outlined below. Calculations are based on estimated occupant usage and must include only the following fixtures and fixture fittings (as applicable to the project scope): water closets, urinals, lavatory faucets, showers, kitchen sink faucets, and pre-rinse spray valves. AND Have in place a permanently installed water meter(s) that measures all potable water use for the entire building and associated grounds. Calibrate meter(s) following the manufacturer's recommendations if the building owner, management organization or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.	WaterSense-certified fixtures and fixture fittings should be used where available. Use high-efficiency fixtures (e.g., water closets and urinals) and dry fixtures, such as toilets attached to composting systems, to reduce potable water demand. Consider using alternative on-site sources of water (e.g., rainwater, stormwater, and air conditioner condensate) and greywater for non-potable applications such as custodial uses and toilet and urinal flushing. The quality of any alternative source of water used must be taken into consideration based on its application or use. Install a building-level water meter to measure and track total potable water consumption in the facility.
WE1	Water Efficient Landscaping	Option 1	2,3, 4				To limit or eliminate the use of potable water or other natural surface or subsurface water resources available on or near the project site for landscape irrigation.	OPTION 1. REDUCE BY 50% (2 points) Reduce potable water consumption for irrigation by 50% from a calculated midsummer baseline case. Landscaped area must constitute at least 5% of the project site area. Reductions must be attributed to any combination of the following items: • Plant species, density, and microclimate factor • Irrigation efficiency • Use of captured rainwater • Use of recycled wastewater • Use of water treated and conveyed by a public agency specifically for non-potable uses Groundwater seepage that is pumped away from the immediate vicinity of building slabs and foundations can be used for landscape irrigation and meet the intent of this credit. However, the project team must demonstrate that doing so does not affect site stormwater management systems.	Not Pursuing
		Option 2	2,3, 4	4			To limit or eliminate the use of potable water or other natural surface or subsurface water resources available on or near the project site for landscape irrigation.	OPTION 2. NO POTABLE WATER USE OR IRRIGATION (4 points) Meet the requirements for Option 1. AND PATH 1 Use only captured rainwater, recycled wastewater, recycled greywater, or water treated and conveyed by a public agency specifically for non-potable uses for irrigation. OR PATH 2 Install landscaping that does not require permanent irrigation systems. Temporary irrigation systems used for plant establishment are allowed only if removed within one year of installation.	Perform a soil/climate analysis to determine appropriate plant material and design the landscape with native or adapted plants to reduce or eliminate irrigation requirements. Where irrigation is required, use high-efficiency equipment and/or climate-based controllers.
WE2	Innovative Wastewater Technologies		2	2			To reduce wastewater generation and potable water demand while increasing the local aquifer recharge.	OPTION 1 Reduce potable water use for building sewage conveyance by 50% through the use of water-conserving fixtures (e.g., water closets, urinals) or non-potable water (e.g., captured rainwater, recycled greywater, and on-site or municipally treated wastewater). OR OPTION 2 Treat 50% of wastewater on-site to tertiary standards. Treated water must be infiltrated or used on-site.	Specify high-efficiency fixtures and dry fixtures (e.g., composting toilet systems, non-water-using urinals) to reduce wastewater volumes. Consider reusing stormwater or greywater for sewage conveyance or on-site mechanical and/or natural wastewater treatment systems. Options for onsite wastewater treatment include packaged biological nutrient removal systems, constructed wetlands and high-efficiency filtration systems.
WE3	Water Use Reduction	30% -2pts, 35% -3pts, 40% -4pts	2,3, 4	4			To further increase water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.	Employ strategies that in aggregate use less water than the water use baseline calculated for the building (not including irrigation). Calculate the baseline according to the commercial and/or residential baselines outlined below. Calculations are based on estimated occupant usage and must include only the following fixtures and fixture fittings (as applicable to the project scope): water closets, urinals, lavatory faucets, showers, kitchen sink faucets, and pre-rinse spray valves.	WaterSense-certified fixtures and fixture fittings should be used where available. Use highefficiency fixtures (e.g., water closets and urinals) and dry fixtures, such as toilets attached to composting systems, to reduce potable water demand. Consider using alternative on-site sources of water (e.g., rainwater, stormwater, and air conditioner condensate) and greywater for nonpotable applications such as custodial uses and toilet and urinal flushing. The quality of any alternative source of water used must be taken into consideration based on its application or use.
	Subtotal Points		26	10	0	0			

Group2 architecture engineering

CREDIT NO.	CREDIT NAME	OPTION	POSSIBLE PNTS	YES	MAYBE	NO	INTENT	REQUIREMENTS	PROPOSED STRATEGY/STATUS/COMMENTS
ENERGY & ATMOSPHERE									
Prereq 1	Fundamental Building Systems Commissioning						To verify that the project's energy related systems are installed, calibrated and perform according to the owner's project requirements, basis of design, and construction documents. Benefits of commissioning include reduced energy use, lower operating costs, reduced contractor callbacks, better building documentation, improved occupant productivity, and verification that the systems perform in accordance with the owner's project requirements.	The following commissioning process activities must be completed by the project team. 1. Designate an individual as the Commissioning Authority (CxA) to lead, review and oversee the completion of the commissioning process activities. a. The CxA must have documented commissioning authority experience in at least 2 building projects. b. The individual serving as the CxA must be independent of the project's design and construction management, though they may be employees of the firms providing those services. The CxA may be a qualified employee or consultant of the owner. c. The CxA must report results, findings and recommendations directly to the owner. d. For projects smaller than 4,650 gross square metres (50,000 gross square feet), the CxA may be a qualified person on the design or construction teams who has the required experience. 2. The owner must document the owner's project requirements. The design team must develop the basis of design. The CxA must review these documents for clarity and completeness. The owner and design team must be responsible for updates to their respective documents. 3. Develop and incorporate commissioning requirements into the construction documents. 4. Develop and implement a commissioning plan. 5. Verify the installation and performance of the systems to be commissioned. 6. Complete a summary commissioning report.	1. Engage a CxA as early as possible in the design process. Determine the owner's project requirements, develop and maintain a commissioning plan for use during design and construction and incorporate commissioning requirements in bid documents. Assemble the commissioning team, and prior to occupancy verify the performance of energy consuming systems. Complete the commissioning reports with recommendations prior to accepting the commissioned systems. 2. Owners are encouraged to seek out qualified individuals to lead the commissioning process. Qualified individuals are identified as those who possess a high level of experience in the following areas: • Energy systems design, installation and operation • Commissioning planning and process management • Hands-on field experience with energy systems performance, interaction, start-up, balancing, testing, troubleshooting, operation and maintenance procedures • Energy systems automation control knowledge 3. Owners are encouraged to consider including water-using systems, building envelope systems, and other systems in the scope of the commissioning plan as appropriate. The building envelope is an important component of a facility that impacts energy consumption, occupant comfort and indoor air quality. While this prerequisite does not require building envelope commissioning, an owner can achieve significant financial savings and reduce risk of poor indoor air quality by including it in the commissioning process. 4. The LEED Canada Reference Guide for Green Building Design and Construction provides guidance on the rigour expected for this prerequisite for the following: • Owner's project requirements • Basis of design • Commissioning plan • Commissioning specification • Performance verification documentation • Commissioning report
Prereq 2	Minimum Energy Performance						To establish the minimum level of energy efficiency for the proposed building and systems to reduce environmental and economic impacts associated with excessive energy use.	OPTION 1. WHOLE BUILDING ENERGY SIMULATION: PATH 1. Model National Energy Code For Buildings (MNECB) PATH 2. ASHRAE 90.1-2007, Energy Standard for Buildings Except Low-Rise Residential BuildingsOR or OPTION 2. PRESCRIPTIVE COMPLIANCE PATH: ASHRAE Advanced Energy Design Guide PATH 1. ASHRAE Advanced Energy Design Guide for Small Office Buildings 2004 PATH 2. ASHRAE Advanced Energy Design Guide for Small Retail Buildings 2006 PATH 3. ASHRAE Advanced Energy Design Guide for Small Warehouses and Self-Storage PATH 4. ASHRAE Advanced Energy Design Guide for K-12 School Buildings or OPTION 3. PRESCRIPTIVE COMPLIANCE PATH: Advanced Buildings™ Core Performance™	ALL OPTIONS must meet all the requirements below: Have an energy meter(s) that measures all energy use, for both building and site energy uses. Calibrate meter(s) following the manufacturer's recommendations if the building owner, management organization or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt. POTENTIAL TECHNOLOGIES & STRATEGIES Design the building envelope and systems to meet baseline requirements. Use a computer simulation model to assess the energy performance and identify the most cost-effective energy efficiency measures. Quantify energy performance compared with a baseline or reference building.
Prereq 3	Fundamental Refrigerant Management						To reduce stratospheric ozone depletion.	Zero use of chlorofluorocarbon (CFC)-based refrigerants in new base building heating, ventilating, air conditioning and refrigeration (HVAC&R) systems. When reusing existing base building HVAC equipment, complete a comprehensive CFC phase-out conversion prior to project completion. Phase-out plans extending beyond the project completion date will be considered on their merits. Projects using Existing District Chilled Water Plants: The CFC phase-out must be completed by 2015 and either comply with the requirements of the authority having jurisdiction or meet the following conditions, whichever is more stringent: • The replacement or upgrade to alternative refrigerants, as determined by a third party assessment, is not economically viable (e.g. simple payback of the replacement is greater than 10 years). • Operation complies with U.S. EPA Clean Air Act Title VI, Rule 608 governing refrigerant management and reporting. • A comprehensive preventative maintenance program is established to minimize CFC leaks to less than 1% annually and the leakage over the remainder of the unit life is maintained below 30%. • The CFC based chillers are used as the lag chillers and do not deliver more than 25% of the total cooling from the plant.	When reusing existing HVAC systems, conduct an inventory to identify equipment that uses CFC-based refrigerants and provide a replacement schedule for these refrigerants. For new buildings, specify new HVAC equipment in the base building that uses no CFC-based refrigerants.

CREDIT NO.	CREDIT NAME	OPTION	POSSIBLE PNTS	YES	MAYBE	NO	INTENT	REQUIREMENTS	PROPOSED STRATEGY/STATUS/COMMENTS
EA1	Optimize Energy Performance	1-19pnts		8			To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.	OPTION 1. WHOLE BUILDING ENERGY SIMULATION (1-19 points for NC) PATH 1. Model National Energy Code For Buildings (MNECB) or PATH 2. ASHRAE 90.1-2007, Energy Standard for Buildings Except Low-Rise Residential Buildings. or OPTION 2. PRESCRIPTIVE COMPLIANCE PATH: ASHRAE Advanced Energy Design Guide PATH 1. ASHRAE Advanced Energy Design Guide for Small Office Buildings 2004 PATH 2. ASHRAE Advanced Energy Design Guide for Small Retail Buildings 2006 PATH 3. ASHRAE Advanced Energy Design Guide for Small Warehouses and Self-Storage Buildings 2008 PATH 4. ASHRAE Advanced Energy Design Guide for K-12 School Buildings or OPTION 3. PRESCRIPTIVE COMPLIANCE PATH: Advanced Buildings™ Core Performance™ Guide	Design the building envelope and systems to maximize energy performance. Use a computer simulation model to assess the energy performance and identify the most cost-effective energy efficiency measures. Quantify energy performance compared with a baseline or reference building.
EA2	On-Site Renewable Energy	1% -1pt, 3% -2pts, 5% -3pts, 7% -4pts, 9% -5pts, 11% -6pts, 13% -7pts			1		To encourage and recognize increasing levels of on-site renewable energy self-supply to reduce environmental and economic impacts associated with fossil fuel energy use.	Use on-site renewable energy systems to offset building energy cost. Calculate project performance by expressing the energy produced by the renewable systems as a percentage of the building's annual energy cost and use the table below to determine the number of points achieved. For projects pursuing Option 1 in EA Credit 1; Optimize Energy Performance, use the building annual energy cost calculated in EA Credit 1. For projects pursuing EA Credit 1 prescriptive paths use the U.S. Department of Energy's (DOE) Commercial Buildings Energy Consumption Survey (CBECS) database to determine the estimated electricity use.	Assess the project for non-polluting and renewable energy potential including solar, wind, geothermal, low-impact hydro, biomass and bio-gas strategies. When applying these strategies, take advantage of net metering with the local utility.
EA3	Enhanced Commissioning			2			To begin the commissioning process early during the design process and execute additional activities after systems performance verification is completed.	Implement, or have a contract in place to implement, the following additional commissioning process activities in addition to the requirements of EA Prerequisite 1: Fundamental Commissioning of Building Energy System: 1. Prior to the start of the construction documents phase, designate an independent Commissioning Authority (CxA) to lead, review, and oversee the completion of all commissioning process activities. 2. The CxA must conduct, at a minimum, 1 commissioning design review of the owner's project requirements basis of design, and design documents prior to mid-construction documents phase and back-check the review comments in the subsequent design submission. 3. The CxA must review contractor submittals applicable to systems being commissioned for compliance with the owner's project requirements and basis of design. This review must be concurrent with the review of the architect or engineer of record and submitted to the design team and the owner. 4. The CxA or other project team members must develop a systems manual that provides future operating staff the information needed to understand and optimally operate the commissioned systems. 5. The CxA or other project team members must verify that the requirements for training operating personnel and building occupants are completed. 6. The CxA must be involved in reviewing the operation of the building with operations and maintenance (O&M) staff and occupants within 10 months after substantial completion. A plan for resolving outstanding commissioning-related issues must be included.	Although it is preferable that the CxA be contracted by the owner for the enhanced commissioning credit, the CxA may also be an independent contractor to through the architect or independent construction management firm not holding construction contracts. The LEED Canada Reference Guide for Green Building Design and Construction provides detailed guidance on the rigor expected for the following process activities: • Commissioning design review. • Commissioning submittal review. • Systems manual.
EA4	Enhanced Refrigerant Management			2			To reduce ozone depletion and support early compliance with the Montreal Protocol while minimizing direct contributions to climate change.	OPTION 1 Do not use refrigerants. or OPTION 2 Select refrigerants and heating, ventilating, air conditioning and refrigeration (HVAC&R) that minimize or eliminate the emission of compounds that contribute to ozone depletion and global climate change. ALL OPTIONS Small HVAC units (defined as containing less than 0.23 kg (0.5 lbs) of refrigerant), and other equipment such as standard refrigerators, small water coolers, and any other cooling equipment that contains less than 0.23 kg (0.5 lbs) of refrigerant, are not considered part of the "base building" system and are not subject to the requirements of this credit. Do not operate or install fire suppression systems that contain ozone-depleting substances such as CFCs, hydrochlorofluorocarbons (HCFCs) or halons.	Design and operate the facility without mechanical cooling and refrigeration equipment. Where mechanical cooling is used, utilize base building HVAC&R systems for the refrigeration cycle that minimize direct impact on ozone depletion and global climate change. Select HVAC&R equipment with reduced refrigerant charge and increased equipment life. Maintain equipment to prevent leakage of refrigerant to the atmosphere. Use fire suppression systems that do not contain CFCs, HCFCs or halons.

CREDIT NO.	CREDIT NAME	OPTION	POSSIBLE PNTS	YES	MAYBE	NO	INTENT	REQUIREMENTS	PROPOSED STRATEGY/STATUS/COMMENTS
EA5	Measurement & Verification					3	To provide for the ongoing accountability of building energy consumption over time.	OPTION 1 Develop and implement a measurement & verification (M&V) Plan consistent with Option D: Calibrated Simulation (Savings Estimation Method 2) as specified in the International Performance Measurement & Verification Protocol (IPMVP) Volume III: Concepts and Options for Determining Energy Savings in New Construction, April, 2003. The M&V period must cover at least 1 year of post-construction occupancy. Provide a process for corrective action if the results of the M&V plan indicate that energy savings are not being achieved. or OPTION 2 Develop and implement a measurement & verification (M&V) Plan consistent with Option B: Energy Conservation Measure Isolation, as specified in the International Performance Measurement & Verification Protocol (IPMVP) Volume III: Concepts and Options for Determining Energy Savings in New Construction, April, 2003. The M&V period must cover at least 1 year of post-construction occupancy. Provide a process for corrective action if the results of the M&V plan indicate that energy savings are not being achieved.	Develop an M&V plan to evaluate building and/or energy system performance. Characterize the building and/or energy systems through energy simulation or engineering analysis. Install the necessary metering equipment to measure energy use. Track performance by comparing predicted performance to actual performance, broken down by component or system as appropriate. Evaluate energy efficiency by comparing actual performance to baseline performance. While the IPMVP describes specific actions for verifying savings associated with energy conservation measures (ECMs) and strategies, this LEED credit expands upon typical IPMVP M&V objectives. Measurement & verification activities should not necessarily be confined to energy systems where ECMs or energy conservation strategies have been implemented. The IPMVP provides guidance on M&V strategies and their appropriate applications for various situations. These strategies should be used in conjunction with monitoring and trend logging of significant energy systems to provide for the ongoing accountability of building energy performance. For the corrective action process, consider installing diagnostics within the control system to alert the staff when equipment is not being optimally operated. Conditions that might warrant alarms to alert staff could include: • Leaking valves in the cooling and heating coils within air handling units; • Missed economizer opportunities (e.g., faulty economizer damper controls); • Software and manual overrides allowing equipment to operate 24 hours a day/7 days a week; • Equipment operation during unusual circumstances (e.g., boiler on when outside air temperature is above 18 °C (65 °F)). Besides control diagnostics, consider employing retro-commissioning services or dedicating staff to investigate increases in energy usage.
EA6	Green Power		2			2	To encourage the development and use of grid-source, renewable energy technologies on a net zero pollution basis.	Engage in at least a 2-year renewable energy contract to provide at least 35% of the building's electricity from renewable sources. Renewable sources are those that meet the Environmental Choice EcoLogo Program requirements for renewable, low-impact generation.All purchases of green power shall be based on the quantity of energy consumed, not the cost. OPTION 1. DETERMINE BASELINE ELECTRICITY USE Use the annual electricity consumption from the results of EA Credit 1: Optimize Energy Performance. or OPTION 2. ESTIMATE BASELINE ELECTRICITY USE Use the U.S. Department of Energy's Commercial Buildings Energy Consumption Survey database to determine the estimated electricity use.	Determine the energy needs of the building and investigate opportunities to engage in a green power contract. Green power is derived from solar, wind, biomass or low-impact hydro sources.
	Subtotal Points		35	12	1	5			

MATERIALS & RESOURCES

CREDIT NO.	CREDIT NAME	OPTION	POSSIBLE PNTS	YES	MAYBE	NO	INTENT	REQUIREMENTS	PROPOSED STRATEGY/STATUS/COMMENTS
Prereq 1	Storage and Collection of Recyclables						To facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.	Provide an easily-accessible dedicated area or areas for the collection and storage of materials for recycling for the entire building. Materials must include, at a minimum, paper, corrugated cardboard, glass, plastics, metals, and, if a municipal collection program is available, organic wastes (including landscaping waste).	Designate an area for recyclable collection and storage that is appropriately sized and located in a convenient area. Identify local waste handlers and buyers for glass, plastic, metals, office paper, newspaper, cardboard and organic wastes. Instruct occupants on recycling procedures. Consider employing cardboard balers, aluminum can crushers, recycling chutes and other waste management strategies to further enhance the recycling program.
MR1.1	Building Reuse: Maintain Existing Walls, Floors, and Roof	55% -1pts, 75% -2pts, 95% -3pts	1-3	1		2	To extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.	Maintain the existing building structure (including structural floor and roof decking) and envelope (the exterior skin and framing, excluding window assemblies and non-structural roofing material). Hazardous materials remediated as a part of the project scope must be excluded from the calculation of the percentage maintained. If the project includes an addition that is more than 6 times (for Core and Shell) and 2 times (for New Construction) the total floor area of the existing building, this credit is not applicable. Government registered or designated heritage building projects are exempted from this floor area requirement.	Consider reusing existing, previously-occupied building structures, envelopes and elements. Remove elements that pose a contamination risk to building occupants and upgrade components that would improve energy and water efficiency such as windows, mechanical systems and plumbing fixtures.
MR1.2	Building Reuse: Maintain Interior Non-Structural Elements		1			1	To extend the life cycle of existing building stock, conserve resources, retain cultural resources, reduce waste and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport.	Use existing interior non-structural elements (e.g., interior walls, doors, floor coverings and ceiling systems) in at least 50% (by surface area) of the completed building, including additions. Hazardous materials remediated as a part of the project scope must be excluded from the calculation of the percentage maintained. If the project includes an addition that is more than 2 times the total floor area of the existing building, this credit is not applicable. Government registered or designated heritage building projects are exempted from this floor area requirement.	Consider reusing existing building structures, envelopes and interior non-structural elements. Remove elements that pose a contamination risk to building occupants, and upgrade components that would improve energy and water efficiency such as mechanical systems and plumbing fixtures. Quantify the extent of building reuse.

CREDIT NO.	CREDIT NAME	OPTION	POSSIBLE PNTS	YES	MAYBE	NO	INTENT	REQUIREMENTS	PROPOSED STRATEGY/STATUS/COMMENTS
MR2	Construction Waste Management	50% -1pts, 75% -2pts	1-2	2			To divert construction and demolition debris from disposal in landfills and incineration facilities. Redirect recyclable recovered resources back to the manufacturing process and redirect reusable materials to appropriate sites.	Recycle and/or salvage non-hazardous construction and demolition debris. Excavated soil and land-clearing debris do not contribute to this credit. Calculations can be done by weight or volume, but must be consistent throughout.	Establish goals for diversion from disposal in landfills and incineration facilities and adopt a construction waste management plan to achieve these goals. Consider recycling cardboard, metal, brick, mineral fibre panel, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. Construction debris processed into a recycled content commodity which has an open market value (e.g. wood derived fuel [WDF], compost or mulch, etc.) may be applied to the construction waste calculation. Designate a specific area(s) on the construction site for segregated or comingled collection of recyclable materials, and track recycling efforts throughout the construction process. Identify construction haulers and recyclers to handle the designated materials. Note that diversion may include donation of materials to charitable organizations and salvage of materials on-site.
MR3	Materials Reuse	5% -1pt, 10% -2pts	1-2		2		To reuse building materials and products in order to reduce demand for virgin materials and reduce waste, thereby lessening impacts associated with the extraction and processing of virgin resources.	Use salvaged, refurbished or reused materials, the sum of which constitutes at least 5% or 10%, based on cost, of the total value of materials on the project. Mechanical, electrical and plumbing components and specialty items such as elevators and equipment cannot be included in this calculation. Include only materials permanently installed in the project. Furniture may be included if it is included consistently in MR Credit 3: Materials Reuse through MR Credit 7: Certified Wood (MR Credit 6 in Core and Shell).	Identify opportunities to incorporate salvaged materials into the building design and research potential material suppliers. Consider salvaged materials such as beams and posts, flooring, paneling, doors and frames, cabinetry and furniture, brick, and decorative items.
MR4	Recycled Content	10% -1pt, 20% -2pts	1-2	1	1		To increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.	Use materials with recycled content such that the sum of post-consumer recycled content plus 1/2 of the pre-consumer content constitutes at least 10% or 20%, based on cost, of the total value of the materials in the project. The recycled content value of a material assembly is determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.	Establish a project goal for recycled content materials, and identify material suppliers that can achieve this goal. During construction, ensure that the specified recycled content materials are installed. Consider a range of environmental, economic and performance attributes when selecting products and materials.
MR5	Regional Materials	20% -1pt, 30% -2pts	1-2	1	1		To increase demand for building materials and products extracted, processed, and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.	Use building materials or products that have been extracted, harvested, recovered and processed within 800 km (500 miles) (2,400 km if shipped by rail or water) of the final manufacturing site. Demonstrate that the final manufacturing site is within 800 km (500 miles) (2,400 km if shipped by rail or water) of the project site for these products. If only a fraction of a product or material is extracted, harvested, recovered, processed and manufactured locally, then only that percentage (by weight) must contribute to the regional value.	Establish a project goal for locally sourced materials, and identify materials and material suppliers that can achieve this goal. During construction, ensure that the specified local materials are installed, and quantify the total percentage of local materials installed. Consider a range of environmental, economic and performance attributes when selecting products and materials.
MR6	Rapidly Renewable Materials		1		1		To reduce the use and depletion of finite raw materials and long-cycle renewable materials by replacing them with rapidly renewable materials.	Use rapidly renewable building materials and products for 2.5% of the total value of all building materials and products used in the project, based on cost. Rapidly renewable building materials and products are made from plants that are typically harvested within a 10-year cycle or shorter. Furniture may be included if it is included consistently in MR Credits 3: Materials Reuse through MR Credit 7: Certified Wood.	Establish a project goal for rapidly renewable materials, and identify products and suppliers that can support achievement of this goal. Consider materials such as bamboo, wool, cotton insulation, agrifibre, linoleum, wheatboard, strawboard and cork. During construction, ensure that the specified renewable materials are installed.
MR7	Certified Wood		1	1			To encourage environmentally responsible forest management.	Use a minimum of 50% (based on cost) of wood-based materials and products that are certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria, for wood building components. These components include at a minimum structural framing and general dimensional framing, flooring, sub-flooring, wood doors and finishes. Include materials permanently installed in the project. Wood products purchased for temporary use on the project (e.g., formwork, bracing, scaffolding, sidewalk protection, and guard rails) may be included in the calculation at the project team's discretion. If any such materials are included, all such materials must be included in the calculation. If such materials are purchased for use on multiple projects, the applicant may include these materials for only one project, at its discretion. Furniture may be included if it is included consistently in MR Credits 3: Materials Reuse through MR Credit 7: Certified Wood (MR Credit 6 in Core and Shell).	Establish a project goal for FSC-certified wood products and identify suppliers that can achieve this goal. During construction, ensure that the FSC-certified wood products are installed and quantify the total percentage of FSC-certified wood products installed.
Subtotal Points			**14**	**6**	**5**	**3**			

Group2 architecture engineering

CREDIT NO.	CREDIT NAME	OPTION	POSSIBLE PNTS	YES	MAYBE	NO	INTENT	REQUIREMENTS	PROPOSED STRATEGY/STATUS/COMMENTS
INDOOR ENVIRONMENTAL QUALITY									
Prerequisite	Minimum IAQ Performance						To establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants.	Meet the minimum requirements of Sections 4 through 7 of ASHRAE 62.1-2007, Ventilation for Acceptable Indoor Air Quality (with errata but without addendaa). AND CASE 1. MECHANICALLY VENTILATED SPACES Mechanical ventilation systems must be designed using the ventilation rate procedure or the applicable local code, whichever is more stringent. CASE 2. NATURALLY VENTILATED SPACES Naturally ventilated buildings must comply with ASHRAE 62.1-2007, paragraph 5.1 (with errata but without addenda). CS ADDITIONAL REQUIREMENT: Mechanical ventilation systems installed during core and shell construction must be capable of meeting projected ventilation levels based on anticipated future tenant requirements.	Design ventilation systems to meet or exceed the minimum outdoor air ventilation rates as described in the ASHRAE standard. Balance the impacts of ventilation rates on energy use and indoor air quality to optimize for energy efficiency and occupant comfort. Use the ASHRAE Standard 62.1-2007 Users Manual (with errata but without addenda) for detailed guidance on meeting the referenced requirements.
Prerequisite	Environmental Tobacco Smoke Control						To prevent or minimize exposure of building occupants, indoor surfaces, and ventilation air distribution systems to environmental tobacco smoke (ETS).	OPTION 1 Prohibit smoking in the building. Prohibit on-property smoking within 7.5 metres (25 feet) of entries, outdoor air intakes and operable windows. Provide signage to allow smoking in designated areas, prohibit smoking in designated areas or prohibit smoking on the entire property.	Prohibit smoking in buildings.
IEQ1	Outdoor Air Delivery Monitoring		1			1	To provide capacity for ventilation system monitoring to help promote occupant comfort and wellbeing.	Install permanent monitoring systems to ensure that ventilation systems maintain design minimum requirements. Configure all monitoring equipment to generate an alarm when the airflow values or carbon dioxide (CO2) levels vary by 10% or more from the design values via either a building automation system alarm to the building operator or a visual or audible alert to the building occupants. All outdoor airflow and/or CO2 sensors must be calibrated as part of EA Prerequisite 1: Fundamental Commissioning of Building Energy Systems and recalibration requirements must be included in the project O&M Manual. AND CASE 1. MECHANICALLY VENTILATED SPACES CASE 2. NATURALLY VENTILATED SPACES	Install CO2 and airflow measurement equipment and feed the information to the heating, ventilating and air conditioning (HVAC) system and/or building automation system (BAS) to trigger corrective action, if applicable. If such automatic controls are not feasible with the building systems, use the measurement equipment to trigger alarms that inform building operators or occupants of a possible deficiency in outdoor air delivery.
	Increase Ventilation		1		1		To provide additional outdoor air ventilation to improve indoor air quality (IAQ) and promote occupant comfort, well-being and productivity.	To provide additional outdoor air ventilation to improve indoor air quality (IAQ) and promote occupant comfort, well-being and productivity. CASE 1. MECHANICALLY VENTILATED SPACES (NON-RESIDENTIAL) CASE 2. NATURALLY VENTILATED SPACES (NON-RESIDENTIAL) and OPTION 1 Show that the natural ventilation systems design meets the recommendations set forth in the CIBSE manuals appropriate to the project space. PATH 1. CIBSE Applications Manual 10: 2005, Natural ventilation in Non-domestic Buildings. PATH 2. CIBSE AM 13:2000, Mixed Mode Ventilation. or OPTION 2 Use a macroscopic, multi-zone, analytic model to predict that room-by-room airflows will effectively naturally ventilate, defined as providing the minimum ventilation rates required by ASHRAE 62.1-2007 Chapter 6 (with errata but without addenda), for at least 90% of occupied spaces.	For mechanically ventilated spaces: Use heat recovery, or more effective ventilation delivery, to minimize the additional energy consumption associated with higher ventilation rates. Projects must ensure they include the effects of the zone air change effectiveness (Eac), and that the energy simulation prepared under EA Prerequisite 2 / EA Credit 1 accounts for the impacts of any additional outdoor air above ASHRAE 62.1-2007 values documented in EQp1. For naturally ventilated spaces: Show that the design meets the recommendations set forth in the Chartered Institution of Building Services Engineers (CIBSE) manuals appropriate to the project space, or use a macroscopic, multi-zone, analytic model to predict that room-by-room airflows will effectively naturally ventilate.
3.1	Construction IAQ Management Plan: During Construction		1	1			To reduce indoor air quality (IAQ) problems resulting from construction or renovation and promote the comfort and well-being of construction workers and building occupants.	Develop and implement an IAQ Management Plan for the construction and pre-occupancy phases of the building as follows: • During construction, meet or exceed the recommended control measures of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) IAQ Guidelines For Occupied Buildings Under Construction, 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter 3). • Protect stored on-site and installed absorptive materials from moisture damage. • If permanently installed air handlers are used during construction, filtration media with a minimum efficiency reporting value (MERV) of 8 must be used at each return air grille, as determined by ASHRAE 52.2-1999 (with errata but without addendaa). Replace all filtration media immediately prior to occupancy.	Adopt an IAQ management plan to protect the heating, ventilating and air conditioning (HVAC) system during construction, control pollutant sources and interrupt contamination pathways. Sequence the installation of materials to avoid contamination of absorptive materials, such as insulation, carpeting, ceiling tile and gypsum wallboard. Coordinate with IEQ Credit 3.2: Construction IAQ Management Plan — Before Occupancy (NC projects only) and IEQ Credit 5: Indoor Chemical & Pollutant Source Control to determine the appropriate specifications and schedules for filtration media. If possible, avoid using permanently installed air handlers for temporary heating/cooling during construction. Consult the LEED Canada Reference Guide for Green Building Design and Construction for more detailed information on how to ensure the well-being of construction workers and building occupants if permanently installed air handlers must be used during construction.

CREDIT NO.	CREDIT NAME	OPTION	POSSIBLE PNTS	YES	MAYBE	NO	INTENT	REQUIREMENTS	PROPOSED STRATEGY/STATUS/COMMENTS
IEQ3.2	Construction IAQ Management Plan: Before Occupancy		1	1			To reduce indoor air quality (IAQ) problems resulting from the construction or renovation to promote the comfort and well-being of construction workers and building occupants.	Develop an IAQ management plan and implement it after all finishes have been installed and the building has been completely cleaned before occupancy: OPTION 1. FLUSH-OUT (PATH 1 OR PATH 2) OPTION 2. AIR TESTING	Prior to occupancy, perform a building flush-out or test the air contaminant levels in the building. The flush-out is often used where occupancy is not required immediately upon substantial completion of construction. IAQ testing can minimize schedule impacts but may be more costly. Coordinate with IEQ Credit 3.1: Construction IAQ Management Plan — During Construction and IEQ Credit 5: Indoor Chemical & Pollutant Source Control to determine the appropriate specifications and schedules for filtration media. The intent of this credit is to eliminate IAQ problems that occur as a result of construction. Architectural finishes used in tenant build-outs constitute a significant source of air pollutants and must be addressed to qualify for this credit.
IEQ4.1	Low Emitting Materials: Adhesives & Sealants		1	1			To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.	All adhesives and sealants used on the interior of the building (i.e., inboard side of the weatherproofing system and applied on-site) must comply with the requirements as applicable to the project scope.	Specify low-VOC materials in construction documents. Ensure that VOC limits are clearly stated in each section of the specifications where adhesives and sealants are addressed. Common products to evaluate include general construction adhesives, flooring adhesives, fire-stopping sealants, caulking, duct sealants, plumbing adhesives and cove base adhesives. Review product cut sheets, material safety data (MSD) sheets, signed attestations or other official literature from the manufacturer clearly identifying the VOC contents or compliance with referenced standards.
IEQ4.2	Low Emitting Materials: Paints & Coatings		1	1			To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.	Paints and coatings used on the interior of the building (i.e., inboard side of the weatherproofing system and applied on-site) must comply with the criteria as applicable to the project scope.	Specify low-VOC paints and coatings in construction documents. Ensure that VOC limits are clearly stated in each section of the specifications where paints and coatings are addressed. Track the VOC content of all interior paints and coatings during construction.
IEQ4.3	Low Emitting Materials: Flooring Systems		1	1			To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.	OPTION 1 All flooring must comply with the following as applicable to the project scope (a small amount of non-compliant flooring may be used for specialty areas provided it does not exceed 5% of floor area): or OPTION 2 All flooring products installed in the building interior must meet the testing and product requirements of the California Department of Public Health Standard Practice for The Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. A small amount of non-compliant flooring may be used for specialty areas provided it does not exceed 5% of floor area.	Clearly specify requirements for product testing and/or certification in the construction documents. Select products that are either certified under the Green Label Plus program, Floorscore program, or for which testing has been done by qualified independent laboratories in accordance with the appropriate requirements.
IEQ4.4	Low Emitting Materials: Composite Wood & Agrifibre Products		1			1	To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.	Composite wood and agrifibre products used on the interior of the building (i.e., inboard side of the weatherproofing system and applied on-site) shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifibre assemblies must not contain added urea-formaldehyde resins. Composite wood and agrifibre products are defined as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates and door cores. Materials considered fixtures, furniture, and equipment (FF&E) are not considered base building elements and are not included.	Specify wood and agrifibre products that contain no added urea-formaldehyde resins. Specify laminating adhesives for field and shop-applied assemblies that contain no added urea-formaldehyde resins. Review product cut sheets, material safety data (MSD) sheets, signed attestations or other official literature from the manufacturer.
IEQ5	Indoor Chemical and Pollutant Source Control		1			1	To minimize building occupant exposure to potentially hazardous particulates and chemical pollutants.	Design to minimize and control the entry of pollutants into buildings and later cross-contamination of regularly occupied areas.	Design facility cleaning and maintenance areas with isolated exhaust systems for contaminants. Maintain physical isolation from the rest of the regularly occupied areas of the building. Install permanent architectural entryway systems such as grills or grates to prevent occupant-borne contaminants from entering the building. Install high-level filtration systems in air handling units processing both return air and outside supply air. Ensure that air handling units can accommodate required filter sizes and pressure drops. Install carbon monoxide alarms in residential projects in spaces that contain or are adjacent to combustion equipment.
IEQ6.1	Controllability of Systems: Lighting		1	1			To provide a high level of lighting system control by individual occupants or groups in multi-ioccupant spaces (e.g., classrooms and conference areas) and promote their productivity, comfort and well-being.	Provide individual lighting controls for 90% (minimum) of the building occupants to enable adjustments to suit individual task needs and preferences. Provide lighting system controls for all shared multi-occupant spaces that complies with ASHRAE/IESNA Standard 90.1-2007 section 9.4.1.2 (Lighting) (with errata but without addendaa), to enable adjustments that meet group needs and preferences.	Design the building with occupant controls for lighting. Strategies to consider include lighting controls and task lighting. Integrate lighting systems controllability into the overall lighting design, providing ambient and task lighting while managing the overall energy use of the building.

CREDIT NO.	CREDIT NAME	OPTION	POSSIBLE PNTS	YES	MAYBE	NO	INTENT	REQUIREMENTS	PROPOSED STRATEGY/STATUS/COMMENTS
IEQ6.2	Controllability of Systems: Thermal Comfort		1		1		To provide a high level of thermal comfort system control by individual occupants or groups in multi-occupant spaces (e.g., classrooms or conference areas) to promote their productivity, comfort and well-being.	Provide individual comfort controls for 50% (minimum) of the building occupants to enable adjustments to meet individual needs and preferences. Operable windows may be used in lieu of controls for occupants located 6 metres (20 feet) inside and 3 metres (10 feet) to either side of the operable part of the window. The areas of operable window must meet the requirements of ASHRAE Standard 62.1-2007-Ventilation for Acceptable Indoor Air Quality, paragraph 5.1 Natural Ventilation (with errata but without addendaa). Provide comfort system controls for all shared multi-occupant spaces to enable adjustments that meet group needs and preferences. Conditions for thermal comfort are described in ASHRAE Standard 55-2004-Thermal Environmental Conditions for Human Occupancy (with errata but without addenda) to include the primary factors of air temperature, radiant temperature, air speed and humidity.	Design the building and systems with comfort controls to allow adjustments to suit individual needs or those of groups in shared spaces. ASHRAE Standard 55-2004 (with errata but without addenda) identifies the factors of thermal comfort and a process for developing comfort criteria for building spaces that suit the needs of the occupants involved in their daily activities. Control strategies can be developed to expand on the comfort criteria, and enable individuals to make adjustments to suit their individual needs and preferences. These strategies may involve system designs incorporating operable windows, hybrid systems integrating operable windows and mechanical systems, or mechanical systems alone. Individual adjustments may involve individual thermostat controls, local diffusers at floor, desk or overhead levels, control of individual radiant panels or other means integrated into the overall building, thermal comfort systems and energy systems design. In addition, designers should evaluate the closely tied interactions between thermal comfort as required by ASHRAE Standard 55-2004 (with errata but without addenda) and acceptable indoor air quality as required by ASHRAE Standard 62.1-2007 (with errata but without addenda), whether natural or mechanical ventilation.
IEQ7.1	Thermal Comfort:Design		1	1			To provide a comfortable thermal environment that promotes occupant productivity and wellbeing.	Design heating, ventilation and air conditioning (HVAC) systems and the building envelope to meet the requirements of ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy (with errata but without addendaa). Demonstrate design compliance in accordance with the Section 6.1.1 documentation.	Establish comfort criteria according to ASHRAE Standard 55-2004 (with errata but without addenda) that support the desired quality and occupant satisfaction with building performance. Design the building envelope and systems with the capability to meet the comfort criteria under expected environmental and use conditions. Evaluate air temperature, radiant temperature, air speed, and relative humidity in an integrated fashion and coordinate these criteria with IEQ Prerequisite 1: Minimum IAQ Performance, IEQ Credit 1: Outdoor Air Delivery Monitoring, and IEQ Credit 2: Increased Ventilation.
IEQ7.2	Thermal Comfort: Verfication		1			1	To provide for the assessment of building occupants' thermal comfort over time.	CASE 1. ALL BUILDINGS Achieve IEQ Credit 7.1: Thermal Comfort – Design. Agree to conduct a thermal comfort survey of building occupants within 6 to 18 months after occupancy. This survey should collect anonymous responses about thermal comfort in the building, including an assessment of overall satisfaction with thermal performance and identification of thermal comfort problems. Agree to develop a plan for corrective action if the survey results indicate that more than 20% of occupants are dissatisfied with thermal comfort in the building. This plan should include measurement of relevant environmental variables in problem areas in accordance with ASHRAE Standard 55-2004, Thermal Environmental Conditions for Human Occupancy, (with errata but without addendaa). Provide a permanent monitoring system to verify that building performance meets the desired comfort criteria as determined by IEQ Credit 7.1: Thermal Comfort – Design.	ASHRAE Standard 55-2004 (with errata but without addenda) provides guidance for establishing thermal comfort criteria and documenting and validating building performance to the criteria. While the standard is not intended for purposes of continuous monitoring and maintenance of the thermal environment, the principles expressed in the standard provide a basis for the design of monitoring and corrective action systems.
IEQ8.1	Daylight & Views: Daylight		1			1	To provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.	OPTION 1. SIMULATION OPTION 2. PRESCRIPTIVE OPTION 3. MEASUREMENT OPTION 4. COMBINATION	Design the building to maximize interior daylighting. Strategies to consider include building orientation, shallow floor plates, increased building perimeter, exterior and interior permanent shading devices, high-performance glazing, and high-ceiling reflectance values; additionally, automatic photocell-based controls can help reduce energy use. Predict daylight factors via manual calculations, or model daylighting strategies with a physical or computer model to assess lighting levels and daylight factors achieved.
IEQ8.2	Daylight & Views: Views		1			1	To provide building occupants a connection to the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.	Achieve direct line of sight to the outdoor environment via vision glazing between 0.76 metres and 2.3 metres (30 inches and 90 inches) above the finished floor for building occupants in 90% of all regularly occupied areas. Determine the area with direct line of sight by totalling the regularly occupied floor area that meets the following criteria: • In plan view, the area is within sight lines drawn from perimeter vision glazing. • In section view, a direct sight line can be drawn from the area to perimeter vision glazing. Line of sight may be drawn through interior glazing. For private offices, the entire floor area of the office can be counted if 75% or more of the area has direct line of sight to perimeter vision glazing. For classrooms and other multi-occupant spaces, the actual floor area with direct line of sight to perimeter vision glazing is counted.	Design the space to maximize daylighting and view opportunities. Strategies to consider include lower partitions, interior shading devices, interior glazing and automatic photocell-based controls.
	Subtotal Points		**15**	**7**	**2**	**6**			

CREDIT NO.	CREDIT NAME	OPTION	POSSIBLE PNTS	YES	MAYBE	NO	INTENT	REQUIREMENTS	PROPOSED STRATEGY/STATUS/COMMENTS
INNOVATION & DESIGN									
ID1	Innovation in Design		1-5	5			To provide design teams and projects the opportunity to achieve exceptional performance above the requirements set by this rating system and/or innovative performance in Green Building categories not specifically addressed by this rating system.	PATH 1. INNOVATION IN DESIGN (1-5 points) Achieve significant, measureable environmental performance using a strategy not addressed in the LEED Canada for New Construction and Major Renovations 2009 and LEED Canada for Core and Shell Development 2009. One point is awarded for each innovation achieved. No more than 5 points under ID Credit1 may be earned through PATH 1—Innovation in Design. Identify the following in writing: • The intent of the proposed innovation credit. • The proposed requirement for compliance. • The proposed submittals to demonstrate compliance. • The design approach (strategies) used to meet the requirements. PATH 2. EXEMPLARY PERFORMANCE (1-3 points) Achieve exemplary performance in an existing credit that allows exemplary performance as specified in the LEED Canada Reference Guide for Green Building Design and Construction. An exemplary performance point may be earned for achieving double the credit requirements and/or achieving the next incremental percentage threshold of an existing credit in LEED. One point is awarded for each exemplary performance achieved. No more than 3 points under IDc1 may be earned through PATH 2— Exemplary Performance.	Substantially exceed a LEED Canada for New Construction and Major Renovations 2009 or Core and Shell Development 2009 performance credit such as energy performance or water efficiency. Apply strategies or measures that demonstrate a comprehensive approach and quantifiable environment and/or health benefits. (Water Use Reduction, Wastewater Use Reducation, Sustainable Sites - Public Transit Access, Green Education and Green Housekeeping.)
ID2	LEED Accredited Professional		1	1			To support and encourage the design integration required by LEED to streamline the application and certification process.	At least 1 principal participant of the project team must be a LEED Accredited Professional (AP).	Educate the project team members about green building design and construction, the LEED requirements and application process early in the life of the project. Consider assigning integrated design and construction process facilitation to the LEED AP.
	Subtotal Points		6	6	3	11			
REGIONAL PRIORITY									
RP1	Durable Building		1			1	To minimize materials use and construction waste over a building's life resulting from inappropriate material selection or premature failure of the building and its constituent components and assemblies.	Develop and implement a Building Durability Plan, in accordance with the principles in CSA S478-95 (R2007) – Guideline on Durability in Buildings, for the components within the scope of the Guideline, for the construction and preoccupancy phases of the building.	Design strategies for building durability that will minimize premature deterioration of the walls and roof, while harmonizing and integrating Architectural, Mechanical, Landscape, and Electrical performance requirements, and meet the needs of the Owner and Contractor. Appropriate technologies and strategies must be appropriate to the region, for example: rain screen walls, overhangs, etc.
RP2	Regional Priority Credit		1-3			3	To provide incentive for the achievement of credits that address geographically-specific environmental priorities.	Up to 3 points for Regional Priority Credit 2 may be proposed for LEED Canada for New Construction and Major Renovations 2009 and Core and Shell Development 2009. The Regional Priority credit is intended to allow adding point emphasis to recognize one or more issues that have additional regional environmental importance. To achieve a Regional Priority credit, the applicant must identify LEED credits which have additional regional environmental importance. A project must achieve the base credit and then propose that credit as a Regional Priority credit.	Determine and pursue the prioritized credits for the project location.
	Subtotal Points		4	0	0	4			
	Total Points		126	61	8	24			

LEED CANADA FOR NEW CONSTRUCTION AND MAJOR RENOVATIONS 2009 Certified 40 - 49 pnts Silver 50 - 59 pnts Gold 60 - 79 pnts Platinum 80+ pnts

4.0 BUILDING CODE ANALYSIS

INTRODUCTION

The new Physical Activities and Wellness (PAW) Centre will be constructed as an addition on the south side of the Van Vliet Physical Education and Recreation Centre (V V C), at the University of Alberta campus in Edmonton.

This Building Code Compliance Report has been written to provide designers with information regarding specific concerns which are applicable to the design and construction of the building for the schematic design stage of the project.

This report is not intended to identify all details of Division B, Part 3 of the Alberta Building Code 2006 (ABC) that apply to the project. Other considerations will be addressed when the design becomes more developed. Members of the consulting team should reference the ABC for guidance in detailed design.

This report has been prepared by Larden Muniak Consulting Inc. (Consultant) at the request of Mr. Doug Ramsey of Group2 Architecture Engineering Ltd.

This report is based on the drawing prepared by Group2 Architecture Engineering Ltd. and dated December 17, 2010.

PROJECT DESCRIPTION

The PAW Centre addition will include a climbing centre on Levels 1 and 2, a fitness centre on Levels 1 and 2 and relocation & expansion to the disability research centre (Steadward Centre) on Level 2.

This project will also consist of a new 3-level concourse addition. The concourse will be an interior north-south corridor that will connect the Van Vliet Physical Education and Recreation Centre, University Hall, the Universiade Pavilion and the new PAW Centre. The concourse will contain occupancies and will not be fire separated from the adjacent buildings. Therefore, following construction, these five buildings will become classified as one building for purposes of applying the Alberta Building Code.

The concourse will include:

- games areas on Level 1,
- community kitchen, retail space and lounge space on Level 2, and
- a mezzanine with study areas and multi-purpose rooms above Level 2.

Additionally there will be renovations within the following areas:

- office spaces in the west building of V V C on Levels 1 and 2,
- lockers in the V V C west wing on Level 1,
- east side of the gymnasium in the VVC west wing on Level 2,
- offices in the V V C west wing on level 2,
- Steadward Centre on Level 2,
- AIPAH on Level 3 east, and
- a new lounge (Option to be confirmed) on the 4th Floor of the V V C east wing.

Sprinklers

University Hall will be fully sprinkled in the near future. Level 1 is currently sprinklered and Levels 2 and 3 will be sprinklered future. Clare Drake Arena is not sprinklered. A 2 h rated fire separation is provided between the Clare Drake Arena and the V V C west wing. Universiade Pavilion is sprinklered.

The VVC west wing is not sprinklered. During renovations, sprinklers will be installed in all renovated areas, including the locker rooms on Level 1 and squash courts on Level 2. In addition, it is anticipated that the large gymnasium and all circulation corridors will be sprinklered. Rooms and suites that will not be sprinklered, will be separated and compartmentalized from the remainder of the building by a 2 h rated fire separation. An alternative solution may be required for the use of compartmentalization in lieu of sprinklers.

The majority of the V V C east building on Level 1 is sprinklered, with the exception of the east pool, lecture halls and gymnasium. Sprinklers are installed on Level 2 of the V V C east building in the vicinity of the west entrance only. Following renovations, the Steadward Centre and AIPAH will be in the V V C east building will be fully sprinklered. The 4th Floor of V V C east building are not sprinklered and will remain unsprinklered. Rooms and suites that will not be sprinklered, will be separated and compartmentalized from the remainder of the building by a 2 h rated fire separation. An alternative solution may be required for the use of compartmentalization in lieu of sprinklers.

All portions of the new addition, and all renovated areas, will be fully sprinklered.

Height and Area
Following construction, the building area will be the area of the entire building, including the new concourse, Van Vliet Physical Education and Recreation Centre, University Hall, the Universiade Pavilion and the new PAW Centre. Therefore, the building area will be approximately 28,200 m2.

The building includes four levels. Level 1 is classified as the 1st storey. Level 2 is classified as the 2nd storey. Level 3 is classified as the 3rd storey in the VVC east wing. Level 3 also includes a mezzanine above Level 2 of VVC west and the new concourse (see Section 2.3 for additional information regarding the mezzanine). Level 4 is located in V V C east only.

Occupancies
The building will include multiple major occupancies.

University Hall: University Hall is classified as a Group D major occupancy and includes 3 levels of offices.

Clare Drake Arena: The Clare Drake Arena is classified as a Group A3 major occupancy.

Universiade Pavilion: The Universiade Pavilion is classified as a Group A3 major occupancy.

Van Vliet Centre (VVC) East / West: The V V C includes Group A2, A3 and D major occupancies. Level 1 includes the east and west pools, locker rooms, racquetball courts, a gymnasium, weight room, medical clinic and offices. Level 2 includes the main gymnasium, offices, squash courts and lecture halls. Level 3 includes office space.

Physical Activity & Wellness Centre: The new PAW Centre is classified as a Group A2 major occupancy and includes the climbing wall and fitness centre.

Concourse: The new concourse will include Group A2 major occupancies including lounges, study areas and multi-purpose rooms.

Mezzanine / Third Storey Options
There is currently a mezzanine located on Level 3, at the north side of the large gymnasium. The mezzanine is currently accessed from an open stair on Level 2 and from the tiered seating on the east side of the gymnasium. During renovations, the tiered seating will be removed. The area of this mezzanine is approximately 223 m2 and this area will not be altered during renovations. The open egress stair which serves this mezzanine will not be altered during renovations.

A new mezzanine will be constructed above Level 2, on the west side of the concourse. This new mezzanine will have a floor area of not more than 500 m2. The north end of the new mezzanine will abut the east end of the existing mezzanine. These mezzanines will be separated from one another by a 2 h rated fire separation. A door may be provided between the two mezzanines for convenience purposes.

The area of the storey in which the mezzanines are located (Level 2) is approximately 27,200 m2. Therefore, the aggregate area of the mezzanine (223 m2 + 500 m2 = 723 m2) is 2.6% of the area of the storey in which they are located. The aggregate area of the mezzanines is in compliance with Sentence 3.2.1.1.(4).

The mezzanines will include open lounge space with tables and chairs as well as enclosed storage rooms and multi-purpose rooms.

Since the area of the new mezzanine does not exceed 500 m2, the following exceptions are applicable:
The mezzanine is not required to be fire separated from Level 2 below.
Half of the required means of egress serving the mezzanine are permitted to be open egress stairs and half of the means of egress are required to be exit stairs.

Walkway Between Buildings
It is anticipated that the new PAW Centre may be connected in the future to the Edmonton Clinic Health Academy to the south by way of an underground walkway. The underground walkway is required to be separated from each building by a 1 h rated fire separation. The walkway is required to be of noncombustible construction, and have a maximum width of 9 m.

General Construction Requirement and Data	
Major Occupancies	Group A, Division 2 Group A, Division 3 Group D
Building Height	4 storeys (height not limited)
Construction Type	Noncombustible
Floor Assembly Ratings	2 h
Mezzanine Ratings	1 h
Load-bearing Elements	Equal to Supported Structure
Roof Assembly	No fire-resistance rating required, per Sentence 3.2.2.18.(3)
Required to be Sprinklered	Yes
Standpipe System Required	Yes

CONSTRUCTION REQUIREMENTS

General Requirements

Since this building contains more than one major occupancy, the construction requirements for the most restricted major occupancy are applicable to the entire building. Therefore, construction requirements for the whole building are based on Article 3.2.2.29., "Group A, Division 3, Any Height, Any Area, Sprinklered."

Compartmentation

The following table lists the required fire-resistance ratings of fire separations in a sprinklered building for specific occupancies and uses.

Interior Fire Separations and Closures (Fully Sprinklered Building)		
Adjacent Major Occupancies (Vertical & Horizontal Separations)	**Fire-Resistance Rating**	**Fire-Protection Rating**
Group A2 and A3	1 h	45 min
Group A2 and D	1 h	45 min
Group A3 and D	1 h	45 min
Shafts	**Fire-Resistance Rating**	**Fire-Protection Rating**
Exit Shafts	2 h	1.5 h
Elevator Shafts	2 h	1.5 h
Vertical Service Shafts	1 h	45 min
Rooms/Spaces	**Fire-Resistance Rating**	**Fire-Protection Rating**
Exit Lobby	Non-Rated Fire Separation	No Rating Required
Storage Rooms (when located in an assembly occupancy area)	1 h	45 min
Electrical Equipment Rooms (when containing equipment that is required to be located in a service room as per the Canadian Electrical Code)	1 h	45 min
Mechanical Room Containing a Fuel-Fired Appliance	1 h	45 min
Refuse Storage Rooms	1 h	45 min
Janitor's Rooms	Non-Rated	N/A

(1) The elevator machine room need not be fire separated from the elevator shaft, provided that both are separated from the remainder of the building by a 1 h rated fire separation.

INTERCONNECTED FLOOR SPACES

There are existing interconnected floor spaces in the west pool and in the Universiade Pavilion which connect Levels 1 and 2. These are existing conditions which will not be altered as part of this project.

Levels 1 and 2 of the concourse and in the PAW Centre will form a new interconnected floor space. Additionally, the new mezzanine on Level 3 of the concourse will be open to Level 2. (See Section 2.3 for additional information on the mezzanine).

Levels 1 and 2 (1st and 2nd storeys) are permitted to be interconnected since:
- the interconnected floor space is fully sprinklered,
- the interconnected floor space includes the 1st storey and the next storey above,
- the interconnected floor space includes only Group A2, A3 and D major occupancies, and
- the building area is unlimited.

EXITING REQUIREMENTS

Location of Exits

The maximum permitted travel distance to the nearest exit is 45 m in sprinklered portions of the building. The maximum permitted travel distance to the nearest exit is 40 m in unsprinklered office areas within the building. The maximum permitted travel distance to the nearest exit is 30 m in all other unsprinklered areas of the building.

Due to the new concourse, various existing exits will become land-locked. Therefore, a number of the exits within the 5 buildings will either be deleted, renovated or relocated. Additionally, new exits will be constructed such that sufficient egress and exiting will be maintained.

Clare Drake Arena: Exiting within the Clare Drake Arena will remain as it exists.

University Hall: University Hall will be served by three exit stairs. The north and southeast exits will remain as they exist. The exit stair on the west will become land-locked due to the concourse. Therefore, a new exit stair will be constructed at the southwest corner of the building to maintain exiting requirements.

V V C West Wing/University Hall: There is currently an exit vestibule between University Hall and the VVC west wing on Level 1. When the concourse is constructed, this exit will be deleted. A new exit will be provided on the south side of University Hall to maintain exiting. The VVC west wing will be provided with access to exit through the new concourse, to the exterior exits on the north and east of the concourse. The VVC west wing is also provided with access to exit through the Clare Drake Arena.

Concourse - East Exit Doors: A new exit located at a mid-height landing between Levels 1 and 2 will be constructed on the east side of the concourse, between University Hall and the VVC east wing. This exit will include 6 exterior exit doors and will serve Levels 1 and 2 of the concourse and the VV east and west wings.

VVC West Wing - North Exit Doors: Levels 1 and 2, at the north side of the VVC, currently exit to the exterior at a mid-height landing which includes 10 exit doors. This exit will be relocated approximately 12 m to the east and will include a total of 9 exit doors. The exit doors will remain at a mid-height landing level between Levels 1 and 2. This exit will serve the concourse (Levels 1 and 2) and the north portion of the VVC west wing (Levels 1 and 2).

VVC West Wing - West Exits: The west side of the VVC includes exterior exit doors serving the west pool, locker rooms and a corridor. These exits will remain as they exist following renovations.

VVC West Wing - Exit Stair at NE Side of Gymnasium: The exit stair located on the northeast side of the large gymnasium will become land-locked and will not be classified as an exit following construction. An alternative solution will be developed to address egress and exiting from since a 45 m travel distance is exceeded in portions of the women's locker room. The locker rooms will be fire separated and compartmentalized from the remainder of the building.

VVC West Wing - Exit Stair at SE Side of Gymnasium: The existing exit stair at the southeast side of the gymnasium is required to be maintained as an exit. This stair will open into a 2 h rated exit vestibule, which opens directly to the exterior.

VVC East Wing - Exit Stair Between Lecture Halls & Northeast Exit Stair: The existing exit stair in the VVC east wing, located between the two lecture theatres will become land-locked following construction of the concourse. This exit is required and will be maintained. The northeast exit stair in the VVC is a required exit which will be maintained as well.

A new 2 h rated fire separated exit corridor will be constructed on Level 2 to serve these exit stairs. The exit corridor will be continuous from the stair between the lecture halls, to the east of the building, where it will open directly to the exterior.

Washrooms, service rooms & spaces and storage rooms are not permitted to open directly into an exit corridor. A vestibule, constructed as a non-rated fire separation, is required between any such room and the exit corridor.

Sprinkler piping, electrical wires and cables and other building services are not permitted to penetrate an exit, unless such services serve only the exit.

An exit is not permitted to be used as a plenum for heating, ventilation or air conditioning.

VVC East Wing - Southeast Exit Stairs: An existing exit stair at the east face of the building serves only an existing weight room on Level 1. This exit stair will be removed. Egress and exiting for the weight room will be maintained due to the exit stair located adjacent to, and to the west of, the stair which will be removed.

The exit stair located to the west of the stair that will be removed serves Levels 1, 2 and 3 and will remain as an exit following renovations. Due to the addition of the new Fitness Centre to the south, the exit stair and exterior walls of the existing building will be altered to allow this stair to remain as an exit.

Fitness Centre: Level 1 is provided with an exit stair on the east and exterior exits on the south. Level 2 is provided with exterior exits on the east, south and west.

Concourse - South Exit Doors: The new south exit from the concourse will include 11 exterior doors and will serve as an exit from the concourse (Level 2), the PAW Centre (Level 2) and the Universiade Pavilion (Level 2).

Universiade Pavilion: Exiting for the Universiade Pavilion will remain substantially as it exists, except that there will be a minor renovation to the northeast exit doors on Level 2 to include a new vestibule.

Occupant Load and Exit Capacity

For full occupant load and exit capacity calculations, see Appendix A.

Travel Distance
The maximum permitted travel distance to the nearest exit is 45 m in sprinklered portions of the building. The maximum permitted travel distance to the nearest exit is 40 m in unsprinklered office areas within the building. The maximum permitted travel distance to the nearest exit is 30 m in all other unsprinklered areas of the building.

Single Means of Egress
In a sprinklered floor area, a single means of egress is permitted from a room or portion of a floor area which has a maximum permitted travel distance of 25 m to a point in which 2 separate directions of travel are possible to an exit, a maximum occupant load of 60 persons, and the maximum permitted area is not more than 200 m2 for assembly spaces, and 300 m2 for business and personal service spaces.

Corridor Width
Corridors are required to have an unobstructed width of not less than 1100 mm.

Door Requirements
The minimum required clear width of a door is 800 mm.

Doors serving rooms with an occupant load of 60 persons or less are permitted to swing in either direction. Doors serving a room with an occupant load greater than 60 persons are required to swing in the direction of exit travel.

Doors equipped with latches serving rooms with an occupant load greater than 100 persons are required to be equipped with a device (panic hardware) that will permit the doors to swing wide open when a force is applied to the device in the direction of exit travel.

Hold-Open Devices
Hold open devices are permitted on doors in a fire separation, including exit doors, provided:
the hold-open device is designed to release by a signal from a smoke detector located where required (provided in Appendix B of NFPA 80, "Standard for Fire Doors and Fire Windows"), and
the hold-open device is designed to release upon actuation of the fire alarm system.

Electromagnetic Locking Devices
Electromagnetic locking devices are permitted to be installed on exit doors and egress doors located in an access-to-exit, provided the locks and doors are installed in conformance with Sentence 3.4.6.15.(4).

Electromagnetic locking devices are required to release upon actuation of the fire alarm signal.

Electromagnetic locking devices are required to release upon loss of power controlling the electromagnetic locking mechanism and its associated auxiliary controls. The locking device is required to release immediately upon actuation of a manually operated switch readily accessible only to authorized personnel (per ABC Sentence 3.4.6.15.(4)).

When a force not more than 90 N is applied to a door equipped with an electromagnetic locking device, an irreversible process will be initiated which releases the locking device within 15 seconds and not relock until the door has been opened. Upon release, the locking device must be reset manually by the manually operated switch which is readily accessible only to authorized personnel.

A legible sign is required to be permanently mounted on the door to indicate that the locking device will release within 15 seconds of applying pressure to the door-opening hardware.

Where electromagnetic locks are also installed on the exit door forming part of the access-to-exit which includes egress doors equipped with electromagnetic locking devices, the total time delay for all electromagnetic locking devices in the access-to-exit path is not permitted to exceed 30 seconds.

STAIR REQUIREMENTS

Treads and Risers
The rise of all new stairs is required to be not less 125 mm to and not more than 180 mm. The run of all new stairs (exclusive of nosings) is required to be not less than 280 mm. This requirement applies to all new interior and exterior stairs.

Leading Edge of Landings and Treads
The leading edge of the stair tread and the leading edge of the stair landing are required to have colour contrast or distinctive patterns to distinguish it from the rest of the tread or landing. This requirement applies to all interior stairs.

The stair tread leading edge is required to have a bevelled edge or a radius between 6 mm and 10 mm for the horizontal dimension. The bevelled edge or radius is permitted to be reduced to 3 mm in horizontal dimension if a resilient floor surface is provided.

Landings
Landings are required to be provided at the top and bottom of each stair.

Each landing is required to be at least the width and depth of the stair in which it occurs, except in a straight run of stairs, the length of the landing is not required to be more than 1100 mm.

Where a door swings over a stair, the landing is required to be provided with a 300 mm clearance between the leading edge of the door and the edge of the landing.

In exit stairs, a door must not restrict the path of travel to less than 750 mm or as required for maintaining exit capacity, measured through the arc of the swing of the door.

Guards
Every stair is required to have a wall or guard on each side.

A guard not less than 1070 mm high is required around floor openings and on interior stair landings. The minimum height of a guard for the stair run is required to be not less than 920 mm and designed to not facilitate climbing.

Openings through the guards are required to prevent the passage of a 100 mm spherical object.

Handrails
A handrail is required to be provided on at least one side of every stair that is less than 1100 mm in width. Stairs that are 1100 mm or more in width require a handrail on both sides.

Handrails are required to be installed at a height of not less than 865 mm and not more than 965 mm. At least one handrail is required to be continuous unless interrupted by a doorway or newels at changes in direction.

For every flight of stairs at least one handrail is required to extend horizontally 300 mm beyond the top nosing. At the bottom of each flight, the sloped portion of the handrail will extend beyond the lowest nosing a distance equal to the depth of the first tread; an additional horizontal extension of at least 300 mm will extend beyond the sloped portion. Care will be taken to ensure that the handrail extension does not create a hazard or obstruction to pedestrian travel.

RAMP REQUIREMENTS

Slope
Ramps in a barrier-free path of travel are required to have a maximum slope of 1 in 12.

Ramps not located in a barrier-free path of travel are permitted to have the following maximum slopes:
1 in 10 in assembly occupancies and exterior ramps, and
1 in 8 in other portions of floor areas.

Minimum Width
The minimum clear width of a barrier-free ramp is 870 mm, measured between handrails.

Landings
The minimum dimension of a landing at the top and bottom, and any intermediate landings where the ramp makes a 180° turn is required to be 1500 mm by 1500 mm. Where a ramp makes a 90° turn, a level area not less than 1200 mm by 1200 mm is required to be provided.

A barrier-free ramp is required to have a level area not less than 1200 mm long and at least the same width of the ramp at intervals of not more than 9 m along the length of the ramp.

Handrails and Guards
In areas designated as barrier-free accessible, ramps are required to be provided with handrails on both sides and be continuously graspable along their entire length.

Handrails and guards are required to be provided for all ramps. These requirements are found in sections 6.4, Guards and 6.5, Handrails in this report.

Slip Resistance
The finished surfaces of all ramps, including landings, are required to be slip resistant.

FIREFIGHTER ACCESS

Fire vehicle access is currently provided to the main firefighter's entrance of University Hall, the Clare Drake Arena building, the VVC and the Universiade Pavilion. The PAW Centre can be provided with firefighter access from the west. Firefighter entrances (as well as fire alarm system sequencing) should be discussed with the local fire authorities.

The entrance(s) designed as the firefighting entrance will be served by an access road that will:

- be between 3 m and 15 m from the entrance measured horizontally,
- be paved with concrete, asphalt, or other material capable of sustaining the load of a fire truck in all weather conditions,
- have a maximum change of gradient of 1 in 12.5 over a minimum distance of 15 m,
- have a centreline radius of 12 m,
- provide an overhead clearance along the access route of 5 m, and
- provide a minimum width of not less than 6 m.

Parking is not permitted to obstruct a designated firefighter entrance or fire department vehicle access route.

FIRE ALARM SYSTEM

General
Each building is currently provided with its own fire alarm system. When the concourse is constructed and all the buildings become connected to one another, the fire alarm system is required to be continuous throughout all buildings. Further description of the fire alarm system design will be included at a later date as the project develops.

The fire alarm system is required to be installed in conformance with CAN/ULC-S524-M, "Installation of Fire Alarm Systems," and is required to be tested in conformance with CAN/ULC-S537-M, "Verification of Fire Alarm Systems."

System Features
The fire alarm system for the building is required to provide the following features:

- an annunciator panel,
- supervision of the sprinkler system and valves,
- water flow alarms, and
- manual pull stations located at every required exit door from a floor area or opening to the exterior, including the main entrance.

Annunciator Panel
Annunciator panels are currently provided in close proximity to the main firefighters entrances at each building. When the concourse is constructed and all the buildings become connected to one another, annunciator panels in each building are required to be connected to each other.

The annunciator panel is required to have separate zone indicators showing the actuation of the fire alarm initiating devices in each:
- Zone coverage: each zone is required to be not more than one storey, or the permitted system area limits specified in NFPA 13, "Standard for the Installation of Sprinkler Systems,"
- shaft equipped with smoke detectors, and
- air handling system equipped with smoke detectors.

FIRE SUPPRESSION SYSTEMS

Automatic Sprinkler System
The building will be fully sprinklered. The sprinkler system is required to be installed in accordance with NFPA 13, "Standard for the Installation of Sprinkler Systems", 2007 edition.

Standpipe System
A standpipe system is required and is provided for this building.

Standpipe systems are required to be installed in accordance with NFPA 14, "Installation of Standpipe and Hose Systems." Sufficient fire hose coverage is required to be provided so that all floor areas can be reached with a 30 m hose length and a 3 m hose spray.

Siamese Connections
The siamese connection for the automatic sprinkler system and the standpipe system (if required) is to be located adjacent to the firefighter's access route. The connection is to be no closer than 3 m and no further than 15 m from the principal entrance to the building.

The distance from the siamese connections to the nearest fire hydrant is required to be not more than 45 m and is required to be unobstructed.

Portable Fire Extinguishers
Portable fire extinguishers are required to be provided throughout the floor areas in accordance with the Alberta Fire Code and NFPA 10.

BARRIER-FREE REQUIREMENTS

Path of Travel
A barrier-free path of travel from the barrier-free entrances is required to be provided throughout all normally occupied floor areas. A barrier-free path of travel is required to maintain a minimum clear width of 920 mm.

Portions of floor areas not requiring a barrier-free path of travel include:
- service rooms,
- elevator machine rooms,
- janitor's rooms,
- service, crawl, attic and roof spaces, and
- mezzanines not served by passenger type elevators.

Vestibules located in a barrier-free path of travel are required to have a 1200 mm space plus the width of any door swinging between the inner and outer sets of doors in the vestibule.

Controls
Controls in a barrier-free path of travel for the operation of the building services or safety devices, intended to be operated by the occupants, are required to be mounted not less than 400 mm and not more than 1200 mm above finished floor. Controls are required to be operable with one hand. These controls include, but are not limited to, manual pull stations, light switches and thermostats.

Doorways and Hardware
Other than doors equipped with a power door operator, the minimum clearance on the latch side of all doors located within a barrier-free path of travel will be 600 mm where the door swings toward the approach side, and 300 mm where the door swings away from the approach side.

All doors in a barrier-free path of travel are required to have a minimum clear width of 800 mm.

Door opening hardware in a barrier-free path of travel is required to be the type that does not require tight grasping and twisting of the wrist.

Washrooms
Where more than one water closet is provided in a washroom, a barrier-free stall is required to be provided for every 10 stalls, or part thereof.

Lavatories are required to be equipped with lever type handles or be automatically operable. Water closets may also incorporate automatic operation.

At least one mirror in the washroom is required to be mounted not more than 1000 mm above finished floor or be inclined to the vertical for the use of disabled persons.

Design requirements of ABC Section 3.8., "Barrier-Free Design" provide additional requirements. Refer to this Section for details on design and installation of grab bars, lavatories and other assistive devices.

Barrier-Free Washroom Stalls
Barrier-free washroom stalls are required to satisfy the design requirements of Articles 3.8.3.8. to 3.8.3.11. of the ABC.

The stall door is required to have a minimum clear width of 800 mm.

All stalls are required to be provided with a clear floor space, inside the stall, having a diameter of 1500 mm. An outside clearance of at least 1400 mm is required to be provided between the outside stall face and any wall-mounted fixture or any other obstruction.

The water closet is required to be located such that the distance from the centerline to the wall is not less than 460 mm and not more than 480 mm.

A coat hook is required to be located not more than 1200 mm above finished floor and project not more than 50 mm.

Universal Toilet Rooms
Universal barrier-free washrooms equipped with a single water closet are required to be designed in conformance with Article 3.8.3.12. of the ABC. These washrooms are required to maintain a minimum dimension of 1700 mm in any direction within the interior of the room.

A clear floor space providing a diameter of 1500 mm is required to be provided to maneuver wheelchairs inside the room.

The water closet is required to have a clearance of not less than 285 mm and not more than 305 mm from an adjacent wall on one side. The fixture layout is required to be designed to permit a wheelchair to back in alongside the water closet, such that the clear space on that side of the water closet is not less than 875 mm.

Grab bars are required to conform to Clause 3.8.3.8.(1)(d). A coat hook is required to be located not more than 1200 mm above finished floor and project not more than 50 mm. A shelf located is required not more than 1200 mm above the floor.

Public Shower Facilities
In assembly buildings, where individual showers are provided, at least one accessible shower stall and one accessible change cubicle are required for each gender. This will ensure that persons with disabilities and others who use wheelchairs or other mobility aids are accommodated.


Figure 1: Speed Table

7.0 CIVIL DESIGN

INTRODUCTION
This report presents the proposed civil systems for the new Physical Activity and Wellness Centre located on the University of Alberta campus in Edmonton, Alberta.

SCOPE OF WORK
The scope of work for civil includes site preparation, grading and surface drainage, asphalt paving, stormwater management and underground deep services sufficient to provide an effective and efficient site. The goals and objectives of the civil design are:

- To provide a design that meets the Client's needs as defined by the program and communication in design meetings.
- To provide a design within the allocated budget.
- To provide a design that is generally consistent with the current City of Edmonton and University of Alberta technical standards and guidelines for site developments.
- To develop a site plan that incorporates sustainable design features that facilitate the pursuit of LEED® Certification.

SITE PREPARATION
The location of the proposed facility is situated between the existing Van Vliet Physical Education and Recreation Centre - East and West Buildings as well as the Universiade Pavilion. The existing site will require demolition of existing plaza space to facilitate construction of the new building.

SITE GRADING AND SURFACE DRAINAGE
Site grading will direct water away from the building at a minimum of 1% grade. Pedestrian friendly grading will be provided for all walkways.

Parking lots and other hard surfaces will be graded between 1% and 4% to maintain positive drainage, prevent unintended ponding and provide a comfortable driving or walking surface.

Drainage will be directed towards soft landscaped islands where possible to provide opportunities for rainwater infiltration. Soft landscaped areas will be graded to reduce the velocity of the water and retain water where possible.

EXISTING PARKING LOT
The existing drop off area and public parking lot will be converted to drop off for Edmonton Disabled Adult Transit Service (DATS) and the existing parking will be reconfigured and designated for users of the facility and will include an increased number of handicap accessible parking stalls.

Additional study of the existing parking lot and traffic pattern will be done to determine if the existing parking lot island should be moved or expanded, to dissuade people from using the DATS drop off for public vehicles.

As part of the study of the existing lot, traffic calming will be considered across the parking lot entrances to reduce traffic speed. Methods to be studied include raised concrete pedestrian walkway crossings such as speed tables (Figure 1) acting as both a large speed bump and to highlight potential pedestrian traffic.

Asphalt paving will be the primary surface of the parking lot and roadways. The asphalt paving will be supported by an aggregate base with one or more layers. The design of the of the pavement and gravel base for the facility shall be based on the geotechnical report.

STORMWATER MANAGEMENT
The site has no specific stormwater retention requirements; however, all stormwater must be contained on the site and directed to the stormwater pipe system and the pipe system designed to handle a 1:5 year storm event.

Stormwater for the entire site including roof and parking lot drainage will be explored to capture as part of a gray-water reuse system. See Mechanical section for a further discussion and options related to this item.

The stormwater system will consist of some of the following: catch basins, manholes, underground piping, landscaped stormwater retention and treatment areas. An inline stormwater treatment system will be considered for the parking lot area to remove suspended solids, oils and other pollutants before entering the gray-water reuse system.

UNDERGROUND DEEP SERVICES
Underground services are required for water, sanitary sewer and storm sewer. Water will be connected through the building to an existing service tunnel. Sanitary sewer service will be connected south to an existing sanitary line. Storm sewer service will be connected to existing lines in the building. Sanitary sewer and storm sewer pipe will conform to CSA B1800 standards for thermoplastic non-pressure piping. Underground deep service piping will be installed in Class 'B' bedding.

Services will be sized to provide adequate building capacities as determined by the mechanical engineer. For the building the sanitary service is estimated to be a 200mm pipe.

6.0 STRUCTURAL DESIGN

PROJECT DESCRIPTION & OBJECTIVES

The structural design for University of Alberta Physical Activity and Wellness (PAW) Centre project can be separated into the following major components:

- A new Fitness Centre located at the corner of 87th Avenue and 114th Street.
- A new Concourse enclosure of the existing breezeway between the Universiade Pavilion / Van Vliet Building (West) and the Van Vliet Building (East) / University Hall.
- Renovations to the existing Van Vliet Building (West) and the Van Vliet Building (East).
- Other structures including utility corridors, entrance canopies, and roof extensions.

Each of these components is discussed in detail in the *Structural Systems* Section below.

The following key concepts have been considered throughout the Schematic Design process:

- Safety and Serviceability – Life safety and comfort of the building occupants are prime considerations.
- Durability and Longevity – Systems, materials, and components will be chosen to enhance the durability and service life of the structures.
- Historical Impact – Systems and materials that complement and highlight the existing structures will be considered.
- Sustainability – Structural systems and materials that have a lower environmental impact and better sustainability characteristics are preferred.
- Economy – Systems that provide better value will be favored, not just least initial construction costs.

This report summarizes the development of the structural Schematic Design for the above noted aspects of the project.

DESIGN BASIS

The structural design for the U of A PAW Centre project will conform to the Alberta Building Code 2006 along with the material standards referenced in the code. Where applicable, load factors for evaluation of the existing buildings will be reduced in accordance with the User's Guide – NBC 2005 Structural Commentaries, Commentary L.

Design Parameters and Loads

Loads used for the design of the structure will be based on the following criteria given in the above noted codes:

Climatic and Site Information

- Importance Category – Normal
- Snow Load, 1/50 – S_s = 1.7 kPa; S_r = 0.1 kPa
- One Day Rain, 1/50 – 97 mm
- Hourly Wind Pressure, 1/50 – 0.45 kPa
- Terrain – Rough
- Seismic Data – $S_a(0.2) = 0.12$; $S_a(0.5) = 0.06$; $S_a(1.0) = 0.02$; $S_a(2.0) = 0.01$; PGA = 0.06
- Seismic Site Classification – D (to be confirmed upon receipt of geotechnical evaluation)
- Seismic Site Coefficients – $F_a = 1.3$; $F_v = 1.4$

Gravity Loads

- Roofs
  - Snow Load – 1.46 kPa plus drifts, taking into consideration parapets and adjacent structures
  - Rain Load – To be determined based on design roof slopes assuming that the drains are accidentally plugged for a period of 24 hours
  - Wind Uplift – To be determined based on design roof geometry
  - Live Load (accessible green roofs) – 4.8 kPa
  - Live Load (other roofs) – 1.0 kPa
  - Superimposed Dead Load (green roofs) – 7.2 kPa
  - Superimposed Dead Load (other roofs) – 1.2 kPa
- Floors
  - Live Load (office areas) – 2.4 kPa
  - Live Load (other areas) – 4.8 kPa
  - Superimposed Dead Load including partition allowance – 1.5 kPa
- Below Grade Utility corridors
  - Live Load (roofs) – 12 kPa or CAN/CSA-S6-06 CL-600 Design Vehicle, whichever produces the most critical effect
  - Live Load (floors) – 4.8 kPa
  - Superimposed Dead Load (Utility corridors) – 3.6 kPa
  - Superimposed Dead Load (Pedestrian Utility corridors) – 0.5 kPa

Where applicable, live loads will be reduced in accordance with ABC 2006 Clause 4.1.5.9.

Vibrations

For new steel structures, floors will be designed for occupant comfort in accordance with AISC Design Guide 11: Floor Vibrations Due to Human Activity.

In existing structures, floor vibrations will be evaluated. In cases where the areas do not meet the requirements of AISC Design Guide 11, the structural system will be critically evaluated to determine if the floor can be economically upgraded to satisfy occupant comfort. Where this is not feasible, we will work with the users to evaluate the usage of the space to avoid vibration issues where possible.

Typically, concrete structures do not present a serviceability issue with respect to vibrations. This is owing to the larger structural mass and inherently higher damping characteristics. In any case, vibrations will be evaluated to ensure occupant comfort.

GEOTECHNICAL CONDITIONS

Subsurface Conditions

A geotechnical investigation for the site is currently underway. At this time, results of that investigation have not been received.

The Schematic Design is based on the report for the adjacent Edmonton Clinic entitled "Geotechnical Site Investigation, Proposed Edmonton Clinic, 114 Street Between 87 Avenue and University Avenue, Edmonton, Alberta" prepared by Ronel Engineering Ltd. and dated October 2006.

Based on the report, the soil profile is expected to be generally as follows:

- Clay Fill – The clay fill is high plastic with traces of silt, sand, and gravel.
- Clay – Stiff glaciolacutrine clay underlies the clay fill starting a few metres below existing grade. It is silty, high plastic, and has traces of gravel. The moisture content of the clay is generally above optimum.
- Sand/Silt – A thick layer of glaciofluvial sand/silt underlies the native clay. The sand is fine-grained with traces of silt and clay. The consistency is compact.
- Clay Till – Low plastic, hard, glacial till underlies the sand / silt layer. It is predominantly clay with varying amounts of gravel, pebbles, and coal fragments. Sand and silt inclusions up to 3 m thick are to be expected.
- Clay Shale / Sandstone – Bedrock was encountered approximately 25 m below existing grade. It is hard to very hard and high plastic.

It should be noted soil stratigraphy is inherently variable. Significant variations in the soil stratigraphy from that indicated in the report are possible.

Seismic Site Class
We expect the seismic site class for the site, in accordance with ABC 2006 Clause 4.1.8.4, to be Class D – stiff soil. This will be confirmed in the site specific geotechnical report. In accordance with ABC 2006 Clause 4.1.8.1, seismic loads and effects will need to be considered for this building.

Ground Water
Measured groundwater levels are approximately 13 m below existing grade. This should not present any construction issues for the basement and below grade construction but will need to be considered in the foundation selection and construction. If bored, cast-in-place concrete piles are the recommended option, this will need to be considered in the construction practices. The groundwater should not present an issue with construction of any shallow foundations (i.e. footings) or below grade structures.

A weeping tile system will be provided for all below grade structures to relieve hydrostatic pressure from the foundation walls.

Foundations
We expect the recommended foundation option for the new construction to be bored, cast-in-place concrete, end-bearing (belled) piles. Piles founded in the clay shale approximately 25 m below existing grade can be designed for an allowable bearing capacity of 1270 kPa.

Where new foundations are required in the renovated areas, we propose to use shallow foundations (i.e. footings) founded in the compact silt/sand located approximately 3 to 4 metres below existing grade. An allowable bearing capacity of 200 to 350 kPa is expected.

Soil sulphate contents in the area range from negligible to moderate (exposure class S-3). Type HS cement will be required for all concrete in contact with native soil.

Once the final geotechnical recommendations for the PAW site are received, the above recommendations may need to be re-evaluated.

Where new foundations or below grade structures will be located such that they may undermine existing structures, underpinning may be required. As this is a time consuming and costly exercise, this process will be avoided as much as possible, and hopefully eliminated altogether, through careful location selection for below grade structures.

SUSTAINABILITY

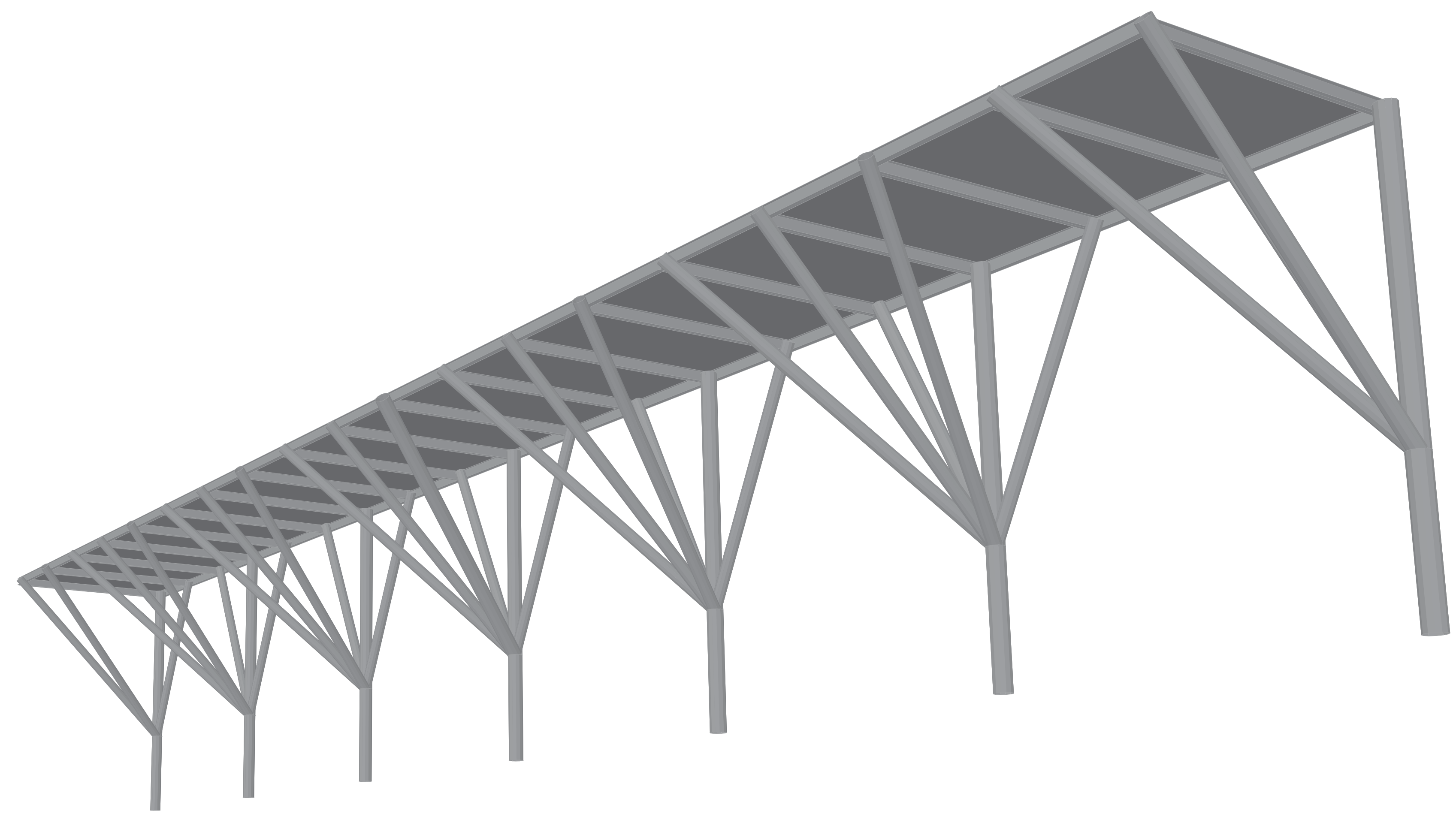
With respect to sustainable practices, the following will be considered from a structural engineering perspective when carrying out the design of the structures:

Timeless Structure – Designing for longevity in buildings involves providing durable systems and adaptable layouts that can easily be upgraded and changed in the future.

Integration and Interdependence of Systems – The structure can be used to lower energy use in the buildings. Examples of this include using the mass of the structure as a heat sink (such as the concrete structure for the Fitness Centre) or exposing the structure, which minimizes material use.

Material and Structural Systems – By efficient design and appropriate system choices, embodied energy for the building can be lowered. This includes re-use of materials; maximizing recycled content (up to 95% in structural steel and 99% in reinforcing steel); using waste products, such as fly ash to replace cement in concrete; considering local materials and labour; and using non-toxic materials. Through efficient design and proper detailing, construction material waste can also be reduced.

Closing the Sustainable Loop – Buildings can be designed to be easily deconstructed. If this is identified as a goal at the outset of the design process, the appropriate choice of systems, materials, and connector details can be made. By making these choices, buildings in the future can be recycled, redirecting waste from landfill and minimizing resources required for new building.



ISOMETRIC CONCOURSE COLUMN

EXISTING STRUCTURES

University Hall – 1951
University Hall is a two-storey building founded on spread and strip footings. It is constructed from a combination of structural steel and cast-in-place concrete with steel joists spanning to concrete beams and columns. Intervention into this building is minimal for this project.

Van Vliet Building (West) – 1958
The Physical Education Building is constructed of a combination of cast-in-place concrete and precast concrete (slabs and double tees). The building is founded on both spread and strip footings and cast-in-place concrete end-bearing belled piles. Interventions into this building will be challenging, as precast elements often have little reserve capacity and connections are difficult. These challenges will be further explored during Design Development.

Van Vliet Building (East) – 1968
The extension to the Physical Education Building, now called the Van Vliet Building (East), is a structural steel building with a concrete substructure. It is founded on cast-in-place concrete, end-bearing belled piles. Interventions will be constructed of structural steel and may require strengthening of existing steel beams and columns. Typically, this upgrading can be accomplished by the addition of steel plates or angles to the existing members. Upgrading of existing foundations is more problematic and costly. These upgrades will be avoided wherever possible through the addition of new columns and spread footings. The extent of required reinforcement will be determined during the construction documentation phase.

Universiade Pavilion – 1981
The Universiade Pavilion is a structural steel building founded on a concrete substructure and pile foundations. The current scope of work does not include significant interventions into this building. Where required, new structure will be of structural steel construction bearing on the existing foundations where possible and on new spread footings where required.

Glen Sather Sports Medicine Clinic – 1987
An addition to the Van Vliet Building (East), this work is constructed of structural steel and cast-in-place concrete. Structural interventions in this area are minimal expect for the construction of the Concourse. It is likely that new columns will need to be built within this space along with associated foundations to carry the new concourse roof described in the *Structural Systems - Concourse* Section below. The extent of this intervention will be further explored during Design Development.

Benchmark Codes
The National Building Code of Canada Structural Commentaries, Commentary L defines a benchmark code as that historical code which satisfies the life-safety requirements of the current code. For wind and seismic loads, the benchmark years are 1960 and 1970, respectively. Buildings constructed prior to these dates are assumed to provide adequate life-safety based on satisfactory past performance, and upgrades to the lateral load resisting systems are not required provided that there are no significant changes and interventions.

Therefore, three of the existing buildings (University Hall, Van Vliet (West), and Van Vliet (East)) do not meet the benchmark code for seismic loading while two (University Hall and Van Vliet (West)) do not meet the benchmark code for wind.

Analysis and upgrading of existing buildings to meet current codes is a time-consuming and costly exercise. Wherever possible, interventions will be kept to a minimum to reduce or eliminate the need for significant upgrades. New and existing structures will need to be laterally separated to eliminate any additional lateral loads on the existing structures.

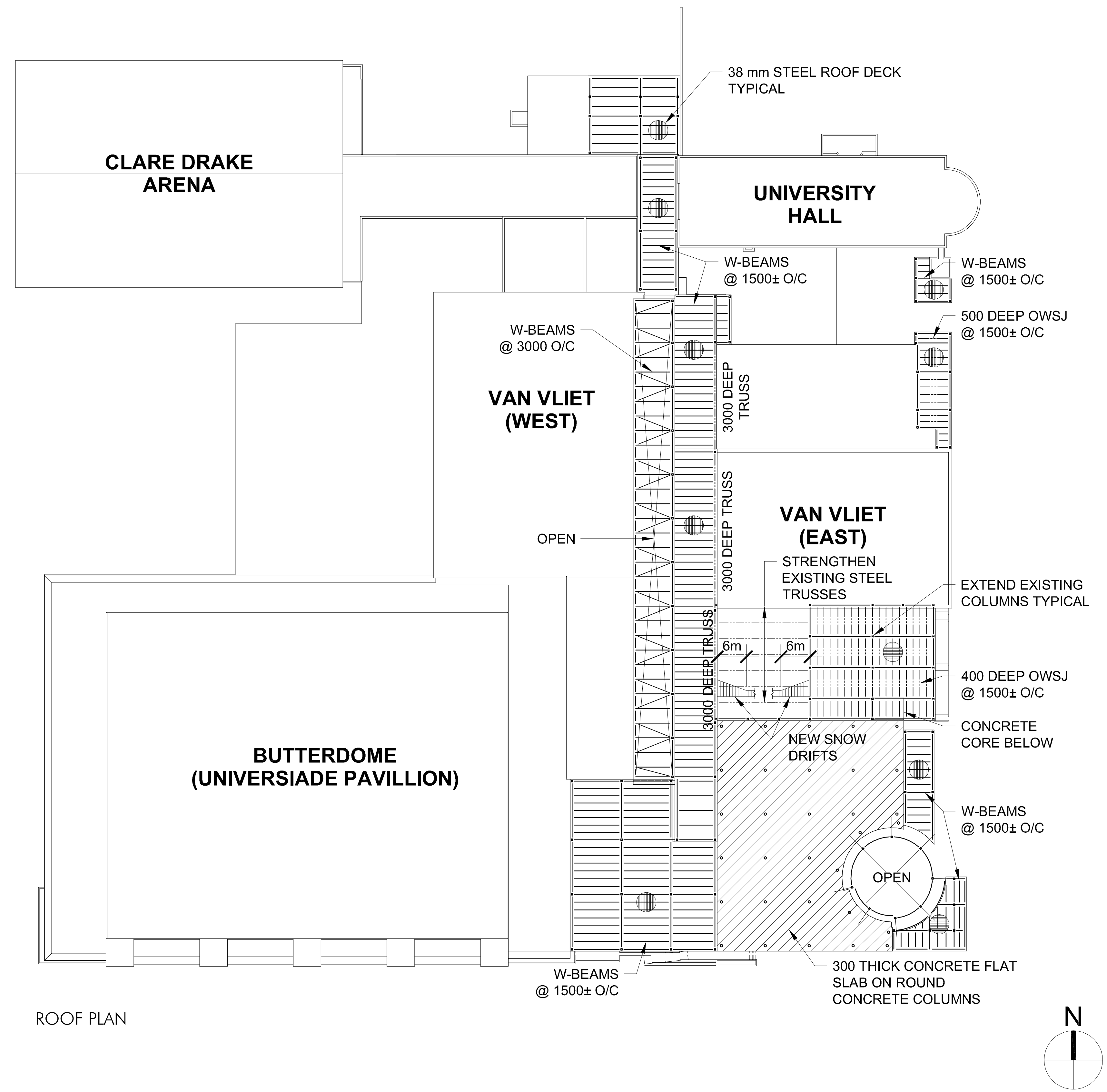
STRUCTURAL SYSTEMS

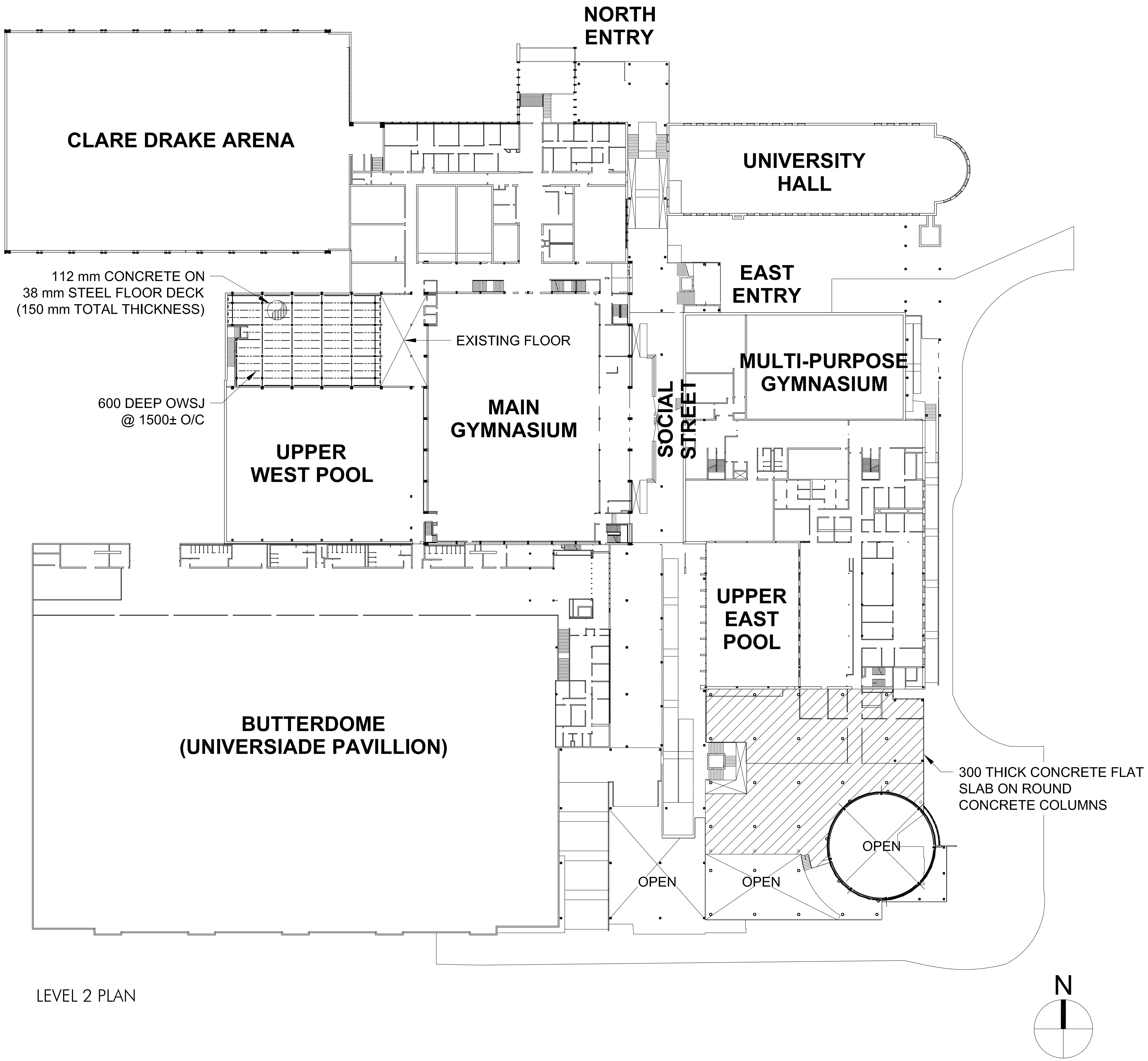
Fitness Centre
The building is expected to be a two-storey space with a climbing wall enclosure. The main floor is approximately 2250 m^2 with a 1400 m^2 mezzanine level. The building will be of cast-in-place concrete construction and does not include any below grade structures except for below grade mechanical and electrical utilities.

The main floor level of the fitness centre will match the adjacent Universiade pavilion, which is slightly lower than existing grade in the area. The building will be adjacent and attached to the Universiade Pavilion and the Van Vliet Building (East).

The climbing wall is expected to be 45' - 50' tall with potential future height expansion. This portion of the building will have translucent glass all around to create a dynamic night-time presence.

The main roof may be partially- or fully-accessible with partially- or fully-green roofed areas while the roof to the climbing wall enclosure will be a lite from above. As well, photovoltaic cells may be included on portions of the roof or façade. These items will be further explored at the Design Development stage.


38 mm STEEL ROOF DECK TYPICAL
CLARE DRAKE ARENA
UNIVERSITY HALL
W-BEAMS @ 1500± O/C
W-BEAMS @ 1500± O/C
500 DEEP OWSJ @ 1500± O/C
W-BEAMS @ 3000 O/C
VAN VLIET (WEST)
3000 DEEP TRUSS
3000 DEEP TRUSS
VAN VLIET (EAST)
OPEN
STRENGTHEN EXISTING STEEL TRUSSES
EXTEND EXISTING COLUMNS TYPICAL
3000 DEEP TRUSS
6m
6m
400 DEEP OWSJ @ 1500± O/C
CONCRETE CORE BELOW
NEW SNOW DRIFTS
BUTTERDOME (UNIVERSIADE PAVILLION)
W-BEAMS @ 1500± O/C
OPEN
W-BEAMS @ 1500± O/C
300 THICK CONCRETE FLAT SLAB ON ROUND CONCRETE COLUMNS
N
ROOF PLAN



LEVEL 2 PLAN

The basic roof and mezzanine framing will consist of two-way, flat plate cast-in-place concrete slabs spanning to round concrete columns. A concrete solution is chosen for the fitness centre for several reasons. It is expected that this portion of the facility will have exposed structure (i.e. no ceilings), so a concrete structure provides a more aesthetically appealing solution. It also reduces the structural depth from approximately 1000 mm for a structural steel / open web steel joist solution to 300 mm for the concrete solution. Furthermore, concrete does not require spray-applied fire-proofing, providing a cleaner aesthetic to the space.

The basic framing is shown in Figures SSK-01 (mezzanine) and SSK-03 (roof). An HSS frame with curved or faceted members will create the shape of the climbing wall enclosure. The main floor will be a 125 mm thick concrete slab on grade, and the foundations will be cast-in-place concrete, end-bearing piles.

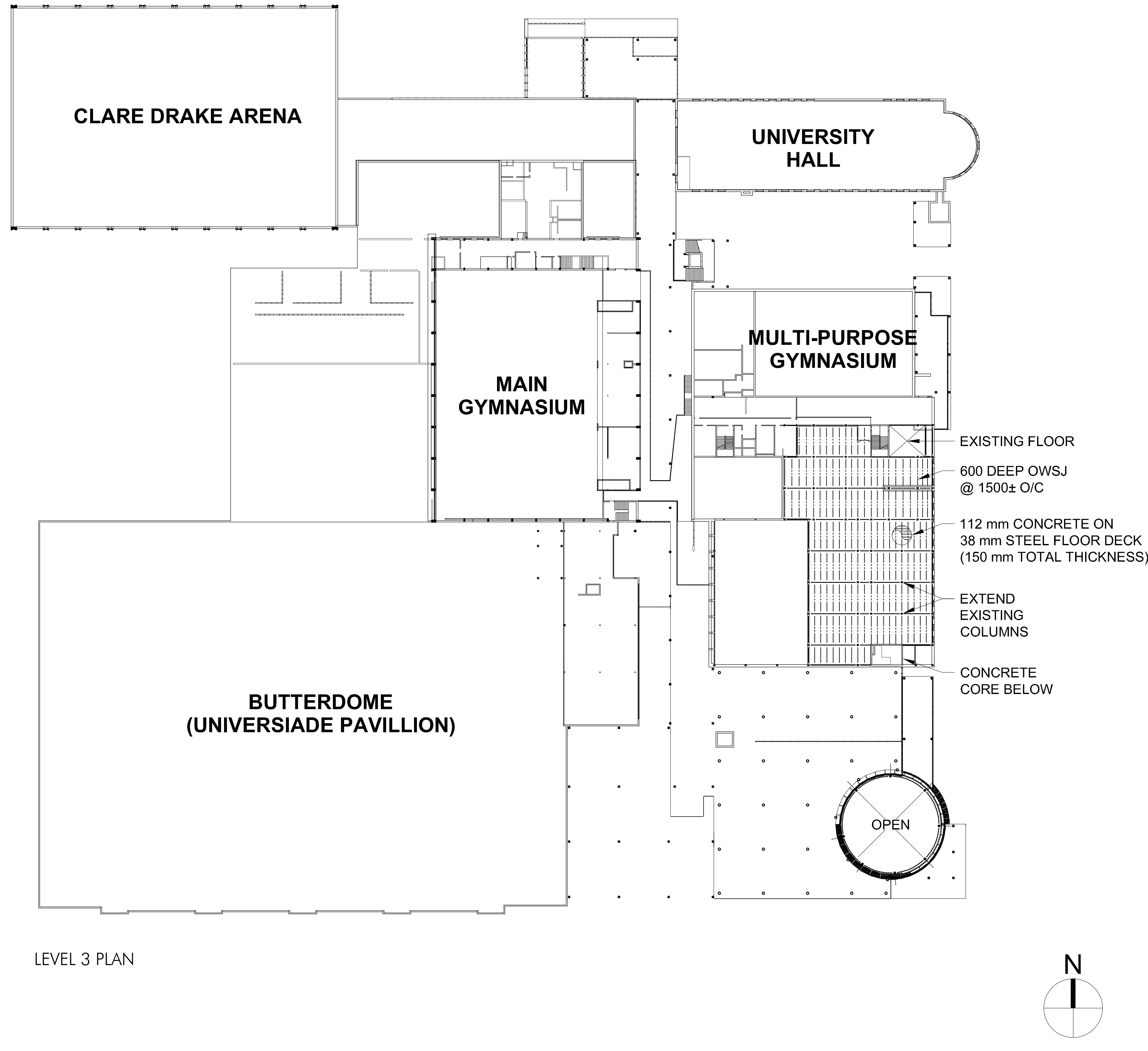
Lateral loads (wind and seismic) will be resisted by a combination of steel braced frames and concrete shear walls at stairs and elevators. As much as possible, the new structures will be laterally separated from the existing buildings so as to eliminate any requirements to upgrade the existing buildings to meet the current codes (see *Existing Structures - Benchmark Codes* Section above for more information).

Concourse

A major component of the project is a new enclosure of the existing breezeway between the Universiade Pavilion / Van Vliet Building (West) and the Van Vliet Building (East) / University Hall. This creates new student common space and a link from the existing fitness facilities to the new fitness centre described in the *Structural Systems -Fitness Centre* Section above.

This portion of the project will be of structural steel construction with an expressive, architecturally exposed structure. Current concepts include a thin roof structure of steel roof deck and W-beams supported on Y-shaped tubular columns. The basic roof framing is shown in Figure SSK-03 and a perspective view of the column concept is shown in Figure SSK-04.

The existing foundations will not be able to support this new structure. Therefore, new columns will be supported on new shallow foundations (i.e. spread footings) that will be coordinated with the existing buildings' foundations (i.e. spread footings and piles). Where conflicts exist, bridging beams will be added that span over the existing foundations and are supported on new footings.


CLARE DRAKE ARENA
UNIVERSITY HALL
MULTI-PURPOSE GYMNASIUM
MAIN GYMNASIUM
EXISTING FLOOR
600 DEEP OWSJ @ 1500± O/C
112 mm CONCRETE ON 38 mm STEEL FLOOR DECK (150 mm TOTAL THICKNESS)
EXTEND EXISTING COLUMNS
CONCRETE CORE BELOW
BUTTERDOME (UNIVERSIADE PAVILLION)
OPEN
N

LEVEL 3 PLAN

Renovations
The existing two-storey squash courts in the Van Vliet Building (East) will be infilled to create two one-storey spaces with a structural steel and open web steel joist solution (see SSK-02). The existing floor to ceiling height, despite being two stories tall, does not provide sufficient clearance for a new structure. Therefore, the roof in the area will be raised to accommodate comfortable ceiling heights and allow for mechanical and electrical systems (see SSK-03). Information on the construction and strengthening works required for this work can be found in the Existing Structures – Van Vliet Building (East) Section above.

Similarly, the existing two-storey fitness room in the Van Vliet Building (West) will be infilled to create two one-storey spaces. It is expected that the new floor will be, for the most part, independent of the existing structure with its own columns, foundations, and bracing. New foundations will be coordinated with existing to avoid conflicts (see SSK-02).

Within the Concourse described in the Structural Systems - Concourse Section above, new second floor plate extensions of the existing Universiade Pavilion, Van Vliet Building (West) and Van Vliet Building (East) will be constructed. These additions will be structural steel framed and supported by a combination of the existing buildings and the new Concourse framing.

Other Structures
A new entrance vestibule will be added at the east entrance of the Van Vliet Building (East). The canopy will be structural steel and will include new columns and foundations.

The roof of the existing Van Vliet Building (East) will be extended towards the west and the south. The extension will align with the east face of the Concourse roof and the north face of the Fitness Centre. A new mechanical penthouse will be added to the west portion of this new roof.

A single tie-in to the existing utility corridors is expected. The location of this tie-in is still under development but is expected to extend east of the Fitness Centre to the existing utility corridors along 114th Street. The utility corridor will be of cast-in-place concrete construction supported on pile foundations.

A future pedestrian corridor below 87th Avenue is proposed to connect the Fitness Centre to the existing Edmonton Clinic Health Academy. This will be cast-in-place concrete construction supported on pile foundations. The north stair of the Edmonton Clinic was constructed to accept this new interface.

The existing LRT utility corridors intersect the southeast corner of the site. It is assumed that the utility corridors will not interfere with the new construction. This includes the utility corridor tie-in and pedestrian corridor noted above.

A new below grade, precast concrete stormwater retention cistern will be provided on the site. The exact location will be defined during Design Development, but one potential location is in the plaza area between the Fitness Centre and the Universiade Pavilion.

SUMMARY
This report establishes the structural systems to be used for each of the elements on the University of Alberta Physical Activity and Wellness Centre based on the collective work completed to date by the consultant team. As we work through Design Development on the project, some of these systems may be adjusted to suit current economic and schedule needs.

7.0 MECHANICAL DESIGN

INTRODUCTION

The new Physical Education and Wellness (PAW) Centre project for the University of Alberta (U of A) will serve to augment the existing Van Vliet Physical Education and Recreation Centre (V V C) in both form and function. The project encompasses 15,801 m^2 of renovated and new construction spaces. Renovated areas include the existing East and West Wings of the V V C, and to a much lesser extent, the Universiade Pavilion. New construction for the PAW Centre involves the addition of a new fitness facility at the corner of 114th Street and 87th Avenue, and an Interior Concourse connecting this new facility with the existing portions of the complex.

The mechanical systems proposed for the project are comprised of new mechanical systems and equipment and refurbished existing equipment. Existing mechanical systems affected by the project will be evaluated and retrofitted to suit the new programmed spaces. Optional sustainable mechanical systems will also be discussed for both existing and new mechanical systems.

The purpose of this report is to convey the fundamental design philosophy and scope of mechanical systems and present infrastructure options as background and recommendation to the Owner. Mechanical systems discussed in this report incorporate:

- Heating system
- Ventilation system
- Storm sewer system
- Sanitary sewer system
- Air conditioning
- Plumbing fixtures
- Domestic hot/cold systems
- Natural gas system
- Fire protection system
- Exhaust air systems
- Piping and ductwork

OVERVIEW

The scope of mechanical work for the new facility includes heating, cooling, ventilation, plumbing, fire protection, and digital controls. The goals and objectives of the mechanical design are:

- To provide a design that satisfies the U of A's *"Design Construction Standards and Guidelines"* document in conjunction with the needs as defined by the functional program, and by communication via design meetings.
- To provide a design within the allocated budget for this work.
- To provide a design that is consistent with the current technical standards and guidelines that relate to facilities of this nature.
- Provide a sustainable, efficient and functional system for the facility.
- The mechanical design will comply with the 2006 Alberta Building Code and 2005 National Plumbing Code and all applicable Provincial and Municipal Codes.
- American Society of Heating Refrigeration and Air-Conditioning Engineers (ASHRAE) Standards and Journals will be used as a best practices guide to establish criteria for heating and ventilation system design.
- System design will reflect a prudent blend of life cycle cost considerations including capital costs, utility consumption costs and simple intuitive systems that can be understood and operated in an effective manner. Consideration will be given to providing accessibility for maintenance. Canadian products will be specified wherever possible to facilitate easy replacement of parts.

The following extracts from the Alberta Building Code are pertinent to facility design and construction in very general terms, and will be respected in the completion of the design for the facility.

- Building Size and Construction Relative to Occupancy
  - Building and Occupancy Classification is under review, and will be required to be sprinklered and compartmentalized.
- Provisions for Fire Fighting
  - Article 3.2.5.8 – under review
  - Article 3.2.5.16 – Fire Department connections for sprinkler system must be located within 45 m (unobstructed) from a fire hydrant and must be located between 3 m and 15 m from the principle entrance to the building.
  - Article 3.2.5.17 – Portable fire extinguishers must be provided in cabinets, not more than 23 m apart.
- Exhaust Duct Negative Pressure
  - Article 3.6.4.1 – Defines that fire compartments must not have individual exhaust fans that discharge into an exhaust riser.
- Horizontal Service Spaces and Service Facilities
  - Article 3.6.4.3 - Defines requirements where ceiling plenum can be used for return air.
- Heating, Ventilation and Air Conditioning
  - Article 6.2.1.1 – Defines ASHRAE, SMACNA and NFPA as reference standards for good engineering practice.
  - Article 6.2.2.1 – Defines that ventilation (mechanical and normal) shall be provided within the facility in compliance with ASHRAE 62.
- Plumbing Services
  - Article 7.1.2.1 – Defines that plumbing systems must be consistent with Municipal or Provincial Regulations.

Programming Space	Summer Design (°C)	Relative Humidity (RH%)	Winter Design (°C)	Relative Humidity (RH%)	Filtration Efficiency	Noise Criteria
Administration and Office Areas	23.9	50% +- 5%	22.2	20% +- 5%	MERV 14	NC-30
Conference Rooms	23.9	50% +- 5%	22.2	20% +- 5%	MERV 14	NC-25
Circulation / Lobby Areas	23.9	50% +- 5%	22.2	20% +- 5%	MERV 14	NC-35
Multipurpose / Studio / Recreation and Fitness	23.9	50% +- 5%	22.2	20% +- 5%	MERV 14	NC-35 to NC-40
Fitness Labs / Testing Areas	23.9	50% +- 5%	22.2	20% +- 5%	MERV 14	NC-35 to NC-40
Interior Concourse	6° above ambient	–	22.2	20% +- 5%	MERV 14	NC-30
Community Kitchen	26.7	50% +- 5%	22.2	20% +- 5%	MERV 14	NC-35
Classrooms	23.9	50% +- 5%	22.2	20% +- 5%	MERV 14	NC-30
Student Study Spaces	23.9	50% +- 5%	22.2	20% +- 5%	MERV 14	NC-25
Commercial Retail	23.9	50% +- 5%	22.2	20% +- 5%	MERV 14	NC-35
Locker / Change Rooms	26.7	50% +- 5%	22.2	20% +- 5%	MERV 14	NC-35
Server Rooms	21.1	50% +- 5%	22.2	20% +- 5%	MERV 14	NC-35

- Fire Protection and Life Safety
    - The complex will be partially sprinklered and partially compartmentalized to NFPA and current Alberta Building Code requirements. NFPA Standard No. 13 will be used as the basis of design.
    - Hand held fire extinguishers will be distributed throughout the complex, at Code mandated travel distances. The extinguishers will be housed in recessed cabinets in all areas, except service spaces.
    - Air system interlocks, and smoke detectors connected to the fire alarm systems will be provided for air system shutdowns.
    - Fire dampers will be provided in all ductwork penetrating any fire resistance rated partitions. It is unclear at this time if smoke dampers, limiting potential smoke movement will be required. Further Code analysis will be required as the design progresses.
    - A Fire Department connection will be required to be provided near the established front entrance to the facility.

INDOOR AIR QUALITY AND NOISE CRITERIA

The table on the opposite page summarizes the proposed design conditions of each program area in the facility.

OUTDOOR DESIGN CONDITIONS

Cooling ASHRAE 0.4% for Edmonton, AB (28.1°C dB; 17.8°C wB)
Heating ASHRAE 0.4% for Edmonton, AB (-29.7°C)

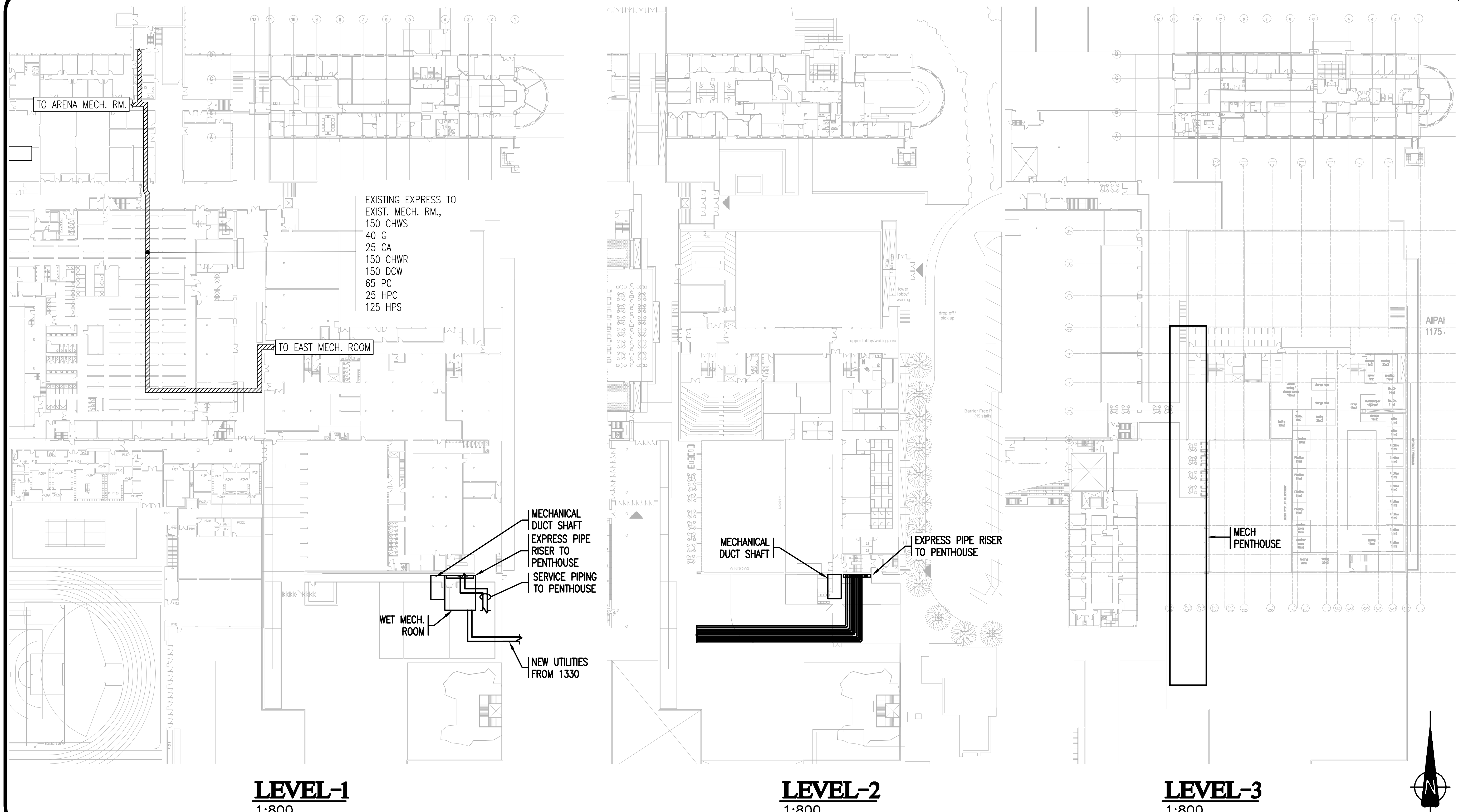
ASBESTOS ABATEMENT CONSIDERATIONS

The scope of this project involves renovations to existing spaces throughout the V V C. It is important to note that the potential need for asbestos abatement should be taken into account by the Cost Consultant and Contractor with the modification or removal of some existing systems and equipment in this facility. Most of the facility has clear labeling to identify if asbestos is present in the insulation or other components of these systems and equipment.

UTILITY SERVICES

The University of Alberta utilizes a district heating and cooling system. High pressure steam (HPS), pumped condensate (PC) and chilled water (CHW) services, as well as domestic cold water (DCW), fire water (FW) and compressed air (CA) services, originate at the Central Utilities Plant and run through an underground network of utility corridors (i.e., utilidors) to serve buildings throughout the entire North campus. These utilidors also have natural gas (G) services running through them. Operating parameters and ranges for the utilities in these utilidors are as follows:

A preliminary review by Hemisphere Engineering Inc. of the existing utilities serving the V V C has led to the development of three (3) options for providing utilities for this project, which are described below.



LEVEL-1
1:800

LEVEL-2
1:800

LEVEL-3
1:800

HEMISPHERE ENGINEERING INC.
CONSULTING ENGINEERS
* EDMONTON * CALGARY * ATLANTA *

DRAWING:	MECHANICAL UTILITIES SERVICING OPTION-U1			**PROJECT:**	UNIVERSITY OF ALBERTA PAW CENTRE		
DATE:	2011-02-28	**JOB No:**	E10211	**SCALE:**	1:800	**DWG. No.:**	MSK-01

Option U1 ("New Wet Mechanical Room")

- A *new wet mechanical room* would be situated below grade on the east side of the new fitness facility of the PAW Centre (at the corner of 114th Street and 87th Avenue).
- A *new utilidor* running east-west underneath 114th Street would be constructed to connect services from the existing utilidor network at location 1330 (i.e., immediately west of the SW corner of the Education Car Park) to the *new wet mechanical room*.
- The *new wet mechanical room* would contain new CHW distribution pumps with Lakos filters, a new steam PRV (pressure reducing) station, a new sprinkler service, and new HPS, PC, natural gas, DCW and CA piping.
- Piping to/from the *new wet mechanical room* would reach the *new mechanical penthouse* via a *new mechanical shaft* situated in either:
  - o the North central portion of new PAW Centre (i.e., abutting the existing East Wing), or
  - o the SE corner of the existing East Wing Pool.
- The *new mechanical penthouse* (located on the NW corner of the roof of the new PAW Centre, immediately west of the East Wing Pool) houses all major air systems, including the air handling unit serving the new Interior Concourse.
  - o Utilities serving the new (and renovated East Wing) spaces for this option are completely independent of the existing utilities that serve the remainder of the V V C.

Medium	Temperature	Pressure
High Pressure Steam (HPS)	205 to 215°C	1035 kPa (150 psi)
Condensate Return (PC)	67°C	200 kPa (29 psi)
Chilled Water Supply (CHWS)	5 to 9°C	690 kPa (100 psi)
Chilled Water Return (CHWR)	>13°C	655 kPa (95 psi)
Compressed Air (CA)		672 kPa (97.5 psi)
Domestic (Cold) Water (DCW)		340 to 450 kPa (50 to 65 psi)
Fire Water (FW)		340 to 450 kPa (50 to 65 psi)
Natural Gas (G)		96.5 kPa (14 psi)

Option U2 ("Tie-Ins at Existing Wet Mechanical Room, Version 1")

- All services would be provided from the *existing utility corridor* that is connected to the West Wing of the V V C (at North end, below the existing entrance), then entering the building at Rm. W-04C. The CHW lines would be connected upstream of control valves TC126307 (West Wing main) and TC126207 (East Wing main).
- The *existing wet mechanical room* (Rm. W-04A) and adjacent *stair* (Rm. W-04) on Level 1 would be expanded eastward to accommodate the new piping that would tie into the existing.
- A *new express riser* would be constructed from Level 1 to Level 3 (furred in the existing space on Level 2) to reach the *existing West Wing mechanical penthouse* (Rm. W2-66).
- New CHW distribution pumps with Lakos filters and a new steam PRV (pressure reducing) station (for all new steam) would be installed in the *existing West Wing mechanical penthouse*. Space requirements would need to be evaluated to determine if the *existing West Wing mechanical penthouse* would need to be expanded eastward to accommodate the new equipment.
- New HPS, PC, CHWS&R piping would run as high as possible from the *existing West Wing mechanical penthouse*, through the new Student Services area and the new Interior Concourse at Level 3 to the *new mechanical penthouse* (located in the NW corner of the new PAW Centre).
- New natural gas, DCW and CA piping would tee off from the existing services running in Level 1 ceiling space in Corridor W-84ZZ (i.e., between existing Men's and Women's Locker Rooms), routing around the East Pool to the *new mechanical shaft* (alternatives described in Option U1) in order to reach the *new mechanical penthouse*.
  - o Option U2 involves tie-ins with several existing utility lines that serve the West and East Wings of the V V C.

Option U3 ("Tie-Ins at Existing Wet Mechanical Room, Version 2")

- Same as Option U2, with the following exceptions:
  - o The existing steam PRV (pressure reducing) station in existing East Wing basement mechanical room (Room E-B2) would be upgraded to accommodate the new PAW Centre connected loads. This could include increasing the downstream header size from 10" to 14" diameter.
  - o A new express riser would run from the basement to Level 3 in East Wing (furred in on Levels 1 and 2) for the new LPS (low pressure steam) and PC piping to reach the new mechanical penthouse.
  - o Only new CHWS&R piping would run as high as possible from the existing West Wing mechanical penthouse through the new Student Services area and the new Interior Concourse at Level 3 to the new mechanical penthouse.
- The anticipated steam load for the new PAW Centre is most likely less than 4,500 kg/h (about 10,000 lbs/h). During a site visit on December 2, 2010 (outside air temperature = -20°C), the existing 125mm diameter HPS line running 180m (about 600 ft) from the *existing wet mechanical room* (Rm. W-04A) to the *existing East Wing basement mechanical room* (Room E-B2) had a pressure drop of approximately 69 kPa (10 psi). With the HPS line sized for 5 to 6 psi drop per 100 feet, then the line's maximum capacity is approximately between 11,300 kg/h and 13,600 kg/h (25,000 lb/h and 30000 lb/h). Therefore, if the East Wing consumes less than 6800 kg/h (20,000 lb/h), then the existing 125mm HPS line may be adequate to also handle the demand for the new PAW Centre.

For both Options U2 and U3, the current steam loads for heating and humidification in the East and West Wings of the V V C must be determined in order to evaluate if there is sufficient capacity available to supply the new PAW Centre using existing mains. However, a significant obstacle to Options U2 and U3 is the lack of means by which to differentiate (and quantify) the consumption of steam between the East and West Wings, as well as between particular building systems throughout the existing complex. In these two scenarios, there is only one common meter for measuring steam consumption for the two Wings, so consequently there is no data available to correlate how much steam is used by a specific air system or group of terminal heating units on a given day (i.e., outdoor conditions). To accomplish this, it would be necessary to work closely with University of Alberta Facilities and Operations Management personnel to clearly delineate operating procedures and estimate the load diversity of the V V C with a highly detailed and promptly executed analysis requiring the purchase of additional specialized instrumentation. With this important information, it can be ascertained if existing HPS and PC lines can accommodate the additional loads from the new PAW Centre and the associated renovated spaces. For these scenarios, it is also advisable to confirm available pressures for natural gas, domestic water and compressed air where they first enter the V V C.

The following table compares the characteristics of these options, highlighting the advantages and disadvantages of each. The comparison is based on a point scale of 1 to 3, with 1 = Least Desirable and 3 = Most Desirable.

The option with the highest total number of points is the preferred choice on the basis of the characteristics listed, which include both technical criteria and the impact of the project on current campus operations. It is recommended that the capital costs of these options be determined by a cost consultant to assist in the decision-making process. The Contractor shall make breakout cost provisions for providing utilities that will not be covered by service providers/utility companies.

Utility Services Options Recommendations

Based on the point scale used in this analysis, Option U1 is the most appropriate choice for this project. The key advantages to Option U1 are the lower quantities of construction material and labour required, minimized energy usage while operating the facility, and the minimal disruption to existing services and function of the facility. There are only two issues of concern with Option U1 that would need to be accommodated by the University: the consequent loss of income generated by Education Car Park and any disruption of ETS service. Otherwise, Option U2 is the next feasible choice, for which there would be less site disruptions than with Option U3 and the impact on facility operations could be mitigated by hoarding, phasing of work, etc.

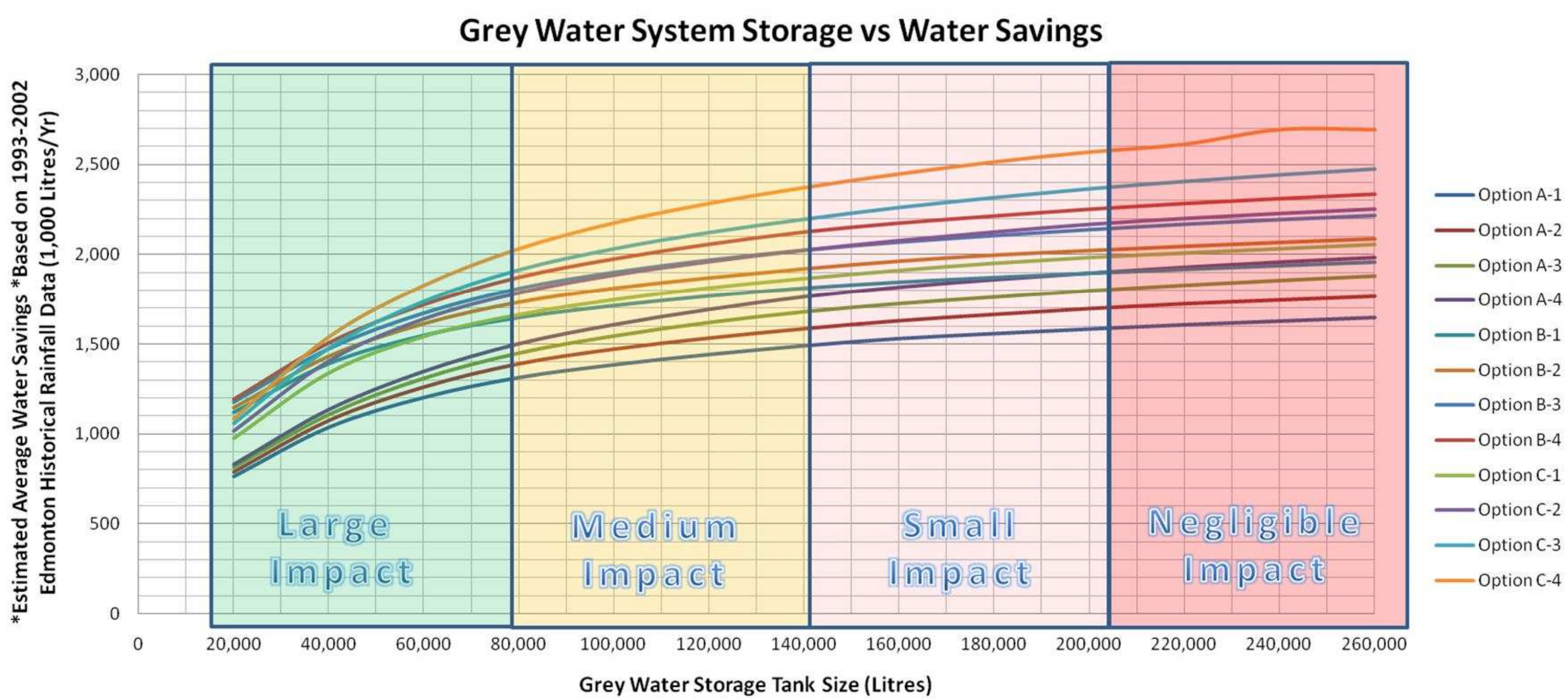
SANITARY AND STORM SEWER SERVICES

Characteristic	Option U1	Option U2	Option U3
Space Requirements			
Consolidation of services; minimal space required for shafts, furred-in piping/ducts, distribution spans.	3	2	1
Significant expansion/modification of existing mechanical rooms and spaces.	3	2	1
Material and Labour			
Minimize total pipe material required.	3	2	1
Minimize piping accessories required (e.g. steam traps, PRVs, etc.)	3	2	1
Minimize/eliminate need for pumped condensate line(s).	3	1	2
Minimize high head installations.	3	2	1
Impact on Existing Campus Operations			
Interruption of services to existing Van Vliet Recreation Centre (e.g. shutdowns for tie-ins).	3	2	1
Complexity introduced to construction schedule; phasing for minimal disruption to Van Vliet Recreation Centre.	3	2	1
Disruption to Education Car Park operation (also leading to loss of income generation).	1	3	2
Disruption to ETS operation (114th Street access).	1	3	2
LEED Issues			
Minimize energy losses (e.g. heat losses, pump head due to friction losses).	3	1	2
TOTAL POINTS	29	22	15

This project requires connection to existing sanitary and storm sewer services. Scope of work will include coordination with EPCOR and University of Alberta Facilities and Operations Management personnel to provide the required services for the facility. Catch basins and manholes referred to in this report are identified based on the labeling system set up by the University of Alberta Planning and Infrastructure Technical Services Department (University Dwg. No. 56190, Sheets 5, 7 and 8 of 17).

Additional plumbing fixture loads for the new PAW Centre, as well as the Steadward Centre and AIPAH being added to the East Wing, are not substantial relative to the existing sanitary loads for the East Wing. Therefore, the sanitary service for these new and renovated portions of the complex can be handled by the existing 8" (200mm) PVC line exiting eastward from the SE corner of the East Wing (which connects to sanitary manhole 20-27s on 114th Street).

With the construction of the new Interior Concourse and the PAW Centre itself, a number of existing storm catch basins and manholes need to be removed or abandoned. For the Interior Concourse, catch basins 20-14r3, 20-14r4 and 20-14r5 should be removed or abandoned, but storm service to existing catch basins 20-14r6, 20-14r7 and 20-14r8 should be maintained (i.e., existing storm lines serving these catch basins should remain or be relocated so as to maintain service). For the new PAW Centre, existing storm catch basins 20-18r1, 20-19r1, 20-19r2, 20-19r3 and 20-20r2, together with existing storm manhole 20-19r and all of their associated storm lines, are to be capped and abandoned since they lie within the footprint of the new facility. Storm service must be maintained for existing catch basins 20-20r1 and 20-21r1, as well as manholes 20-18r, 20-20r and 20-21r. Further investigation and site surveying must be conducted to verify all inverts and sloping of existing storm sewer components to remain and determine how they can be integrated into the new construction. New storm drainage and manholes will be provided for residual site drainage and will be serviced by the existing 18" (450mm) storm line running under the northside of the Universiade Pavilion that leads to storm manhole 20-14r immediately west of the West Wing Pool.



PLUMBING SYSTEMS

The new facility will be provided with institutional grade plumbing fixtures as required by UofA standards and the program. The locker/change room and washroom layouts will be reviewed for code compliance. A copy of the plumbing brochure is available upon request to demonstrate the quality of fixtures that will be specified. Selection of plumbing fixtures will be completed with input from the Architect and Client User Groups. Domestic cold, hot, and hot re-circulation systems will be provided to serve the installed fixtures. Internal storm and sanitary drainage systems will be incorporated into the building and will be connected to the municipal underground drainage utilities.

Plumbing fixture provisions shall consider high efficiency performance for urinals, water closets, lavatories, and showers. Dual flush water closets, ultra low flow urinals and water free urinals will also be considered.

New domestic cold water piping will be networked throughout the complex from the building service connections. The water will be metered at the Utility corridor entry to the building. Renovated spaces comprising locker/change and wash rooms currently serviced with domestic cold water will be re-used and replaced as needed upon close inspection of existing pipe distribution.

The majority of the facilities' existing domestic hot water is currently generated by a single 2300gal duplex steam immersion tube heater located in the West mechanical room. A smaller secondary system comprised of a 500 gallon storage tank and duplex instantaneous hot water generators services the existing Van Vilet, and women's change room located in the East Mechanical Room. Since the majority of the fixture loads in the overall physical education facility, including the PAW center expansion is situated within existing programming space earmarked for renovation, the impact of the overall additional loads to the domestic hot water system from the PAW center expansion and renovation is anticipated to be minimal.

Solar Hot Water Heating Plant

The scope of the renovations, in conjunction with the high domestic hot water load of the facility, unveils a unique opportunity to dramatically reduce energy consumption with the use of a solar hot water heating plant. A solar hot water heating plant harnesses the suns renewable energy for the purpose of providing heat for domestic and heating water applications.

The solar hot water system proposed will be designed to provide approximately 2/3 solar fraction to produce domestic hot water for the facility. Approximately 100 panels situated on the new PAW center roof will be required, complete with secondary steam immersion tube heaters (in the event that additional domestic heating is required). A three tank configuration will be considered as a direct replacement for the dated domestic heating water systems. This will allow optimum benefits of the solar hot water heating system via a new, centralized domestic heating plant in the penthouse. Domestic hot water will be generated for distribution at 54°C. Duplex domestic hot water recirculation pumps will be provided to ensure availability of hot water throughout the various portions of the facility. New distribution piping will be required to reconnect existing mains currently serviced by the old domestic heating system.

In conjunction to providing domestic hot water heating, the system will be capable of utilizing stored solar energy to provide heating glycol. The glycol will be utilized for supplying heat to the concourse AHU heating coil, which is used to temper concourse ventilation air. A secondary backup heating system from the main heating plant will also be provided. Expanding the function of the solar heating plant will optimize the application of solar renewable energy, which in turn, will have a dramatic impact to the overall energy consumption of the new interior concourse.

Preliminary budget investigation for the solar hot water plant produces an opinion of probable cost of about $4,500 per panel (for a Viessmann system). If the solar hot water heating plant is selected as a viable option, further investigation to the technology will be performed. A preliminary energy model may be completed to evaluate the additional energy savings and cost benefits of a Viessmann (or competitive) system.

Grey Water Recycled System

Grey Water storage, filtration and distribution systems can be considered to further enhance water savings. This involves the capture and recycling of rooftop storm water, paved site water runoff, swimming pool backwash water and cooling equipment condensing water. The recycled water will be stored, appropriately treated, disinfected and supplied to plumbing fixtures such as water closets and urinals. In the event that grey water storage capacity is depleted, the system will revert back to utility water supply. When the storage overflows, the discharge will be directed to the storm or sanitary mains as required.

This reclamation and recycling system will further reduce the consumption of potable service water whereby reducing water costs and sewage treatment charges. It will also reduce the utility company's requirement for water quantity, treatment and future distribution upgrades as well as being environmentally friendly.

Grey Water System Description

Rooftop storm drainage from the new building will be connected to the existing building storm drainage system. The collected storm runoff will discharge into a series of holding and sedimentation chambers. The swimming pool backwash holding chamber will have an emergency overflow to the site sanitary drainage system; likewise, the storm water holding chamber will have an emergency overflow to the site storm drainage system. The backwash holding chamber will be independent to the storm water for the purpose of dechlorination, filtration and independent overflows.

The storm holding chambers will incorporate sediment, filtration and recirculation system as required to prevent slime buildup and tank flushing. Each chamber will have level alarms, switch, controls for system operation and monitoring.

The combined backwash and storm water will be filtered, sterilized with ultraviolet light, injected with a dye color and pumped through an independent non potable and colour coded piping distribution system to water closets and urinals. When the storage capacity is depleted, water supply will revert to the utility water supply using backflow prevention and air gaps.

Grey Water System Options

The options listed below and shown on the graph curves vary in the area of collected water volume, swimming pool backwash the assumed accuracy of the number of occupants for water usage and storage capacity used.

Option A (A1-A4 Range on Graph):
Captured Area 8,500 m²
Occupants Range 1,150 to 1,750 full-time
1,050 to 1600 part-time

- Lowest value of all options.
- Will have insufficient storage water during periods of no rainfall.
- No swimming pool recycled backwash system.

Option B (B1-B4 Range on Graph):
Captured Area 8,500 m²
Occupants Range 1,150 to 1,750 full-time
1,050 to 1600 part-time
Swimming Pool Backwash 8,700 liters every 2 weeks

- East swimming pool backwash water captured.
- Will have less periods of insufficient storage water during no rainfall.
- Typical water treatment distribution system to Option A.

Option C (A1-C4 Range on Graph):

Captured Area	22,000 m^2
Occupants Range	1,150 to 1,750 full-time
	1,050 to 1600 part-time

- Greatly increased the amount of captured recycled water.
- Larger water storage required.
- Minimal increase in water treatment/distribution system to Option A.
- No swimming pool recycled backwash system.
- May have insufficient storage water during periods of no rainfall.

Grey Water System Considerations

- Location and size of storage cisterns will determine overall water savings.
- A dual piped cold water distribution system is required.
- The materials used in the roof construction where the water is collected should not leach dangerous chemicals into the system.
- The use of recycled water for present and future HVAC equipment make up water may be used.
- The increasing cost of potable water and sewage treatment makes this system more desirable.
- The paved site water will have provisions for a sedimentation and collection interceptor at the outside paved area to mitigate the amount of debris entering the grey water system.
- Whichever option is selected the optimum holding tank capacity recommended is in the range of 80,000 - 100,000 liters. Above 100,000 liters the savings is insignificant compared to the tank enlargement and below 80,000 liters the savings decreased significantly compared to the tank capacity.

Grey Water System Recommendations

The key to finalizing the system is to determine a compromise for maximum payback, versus water saving. To accurately determine this, the actual building occupancy and water usage values must be determined / known. Hemisphere will work with project stakeholders to establish an accurate occupancy for the study.

Based on cursory assumptions on storage and consumption, a projected payback range of 20-30 years may be expected. Option B and C are expected to produce similar results: If swimming pool backwash reclaim is possible then Option B may be the viable choice, otherwise Option C may be considered to offset the lost potential of using the pool backwash.

HEATING SYSTEMS

The following is a list of existing building systems and components that are affected by these renovations, with a brief description of the work to be done:

- West Wing Main Gym Steam Unit Heaters: Units on the east side of the gymnasium above the bleachers are to be relocated westward, or removed if they are determined to be no longer required for the heating load.
- Radiation in offices along east wall of West Wing (Rms. W1-46, 47, 49, 51, 53 to 59): Units are to be removed and associated steam/condensate lines capped to accommodate renovations to Level 2, including the construction of the Interior Concourse.
- Entrance Heater in vestibule at east entrance to West Wing (Rm. W1-46ZZ): Unit shall to be removed and associated steam/condensate lines capped to accommodate renovations to Level 2, including the construction of the Interior Concourse.
- Entrance Heaters in vestibule at north entrance to West Wing (Rm. W1-17ZZ): These three (3) units are to be removed and associated steam/condensate lines capped for renovation/relocation of north entrance to West Wing of Van Vliet Recreation Centre.
- Entrance Heater in vestibule between West Wing and University Hall (Rm. W-01ZZ): Unit to be removed and associated steam/condensate lines capped for renovation/relocation of north entrance to West Wing of Van Vliet Recreation Centre.
- Entrance Heater in vestibule at west entrance to East Wing (Rm. E-116ZZ): Unit to be removed since the doorway will no longer open to outside (i.e., will be opening to the Interior Concourse).
- Entrance Heaters in Stair E-139YY (located in SE corner of East Wing, Level 1): Since this stair will be enclosed and its door no longer opening to the outdoors, the LPS steam lines to these two (2) units can be capped and the units abandoned.

A central steam converter heating station will provide heating hot water for the facility. The heating plant will consist of two shell and tube heat exchangers sized to 65% of the total heating requirement. A primary/secondary pumping system will circulate heating hot water using reverse return piping and cascading loops to the various heating loads throughout the facility.

A glycol converter station will be used to produce heated 50/50 glycol for use in air handling units. Hot water will be distributed to pick up envelope heating and zone reheat for the facility. The principal perimeter heating system for the complex will be comprised of a combination of terminal heating, both ceiling mounted, and wall/floor mounted. Reheat coils in terminal box equipment serving zones with exterior loads will be sized to pickup any heating shortfalls from the localized heating equipment. Vestibules and other high heat loss areas will be heated with hot water force flows.

The perimeter heating system will be a combination of perimeter ceiling mounted radiant panels and baseboard radiation. Zoning of the perimeter heating system will be developed as the detailed design emerges. It would be the intent to provide zoning suitable to provide thermal comfort and control in spaces.

Atrium/(Interior Concourse) Specialty Heating Provisions

Investigation of existing facility mechanical systems reveals a unique opportunity to recover low grade waste heat coming from an adjacent arena chiller plant. Provisions for condenser water heat recovery will be investigated to provide heat for the new interior concourse. The current chiller condenser system is currently tied into the campus utilities chilled water service to dissipate absorbed heat. A proposed recovery system may include new piping to bypass the condenser water into an in-slab heating glycol distribution system with heat transferred via new heat exchangers.

When used in conjunction with the solar hot water heating plant described earlier, and an electrical co-generation system (which will be described later), the consumed energy for the interior concourse will be dramatically reduced. The combined efforts of utilizing co-generation, heat recovery and renewable energy harness the spirit of Near-Zero energy consumption as proposed by the project team.

COOLING SYSTEMS

Facility cooling will be accomplished with the use of district chilled water. The chilled water system will comprise the utilization of centrifugal separation filters to mitigate fluctuations in water quality during winter free cooling mode of the chiller plant. Variable flow duplex pumping will be utilized to distribute chilled water service to the air handling units.

Any requirements for cooling of server rooms, or any other 24 hour/365 cooling will be satisfied by implementing fancoil cooling systems, independently piped with a localized backup chiller to ensure uninterrupted cooling. The localized backup chiller will be water cooled and tied in series into the return temperature line of the chilled water distribution system. If a third level of redundancy is required, backup chiller condenser cooling may be achieved by the use of domestic water. Where applicable, supplemental zone level cooling may be considered using hydronically cooled fan coil units for rooms requiring high density cooling and not requiring 24 hour/365 cooling.

HUMIDIFICATION

Humidification will be provided for spaces serviced by the primary air system and concourse unit. The arena and change rooms will not require additional winter humidification. Humidification will be provided by a dedicated steam converter spool at the primary PRV station located in the sub basement wet mechanical room. Insulated dispersion tubes will be utilized for short steam absorption into the air stream at each new air handling unit. Control of the humidification system will be via the use of humidity space sensors located throughout the facility.

VENTILATION SYSTEMS

The following is a list of existing building systems and components that are affected by these renovations, with a brief description of the work to be done:

- *West Wing Main Air System* (located in West Wing mechanical penthouse W2-66): To be rebalanced for the renovation of the existing West Wing Men's Locker Room space and Fitness Centre on Level 1 to accommodate the new Men's and Women's Locker Rooms, as well as other minor renovations throughout the West Wing. Further study to retrofitting system to incorporate heat recovery will be investigated.

- *West Wing Fitness Centre Air System* (located in West Wing basement mechanical room W-88C): To be evaluated to determine if it can serve the new Handball Courts relocated to Level 2 of the existing Fitness Centre.

- *Ductwork for Seminar Room W1-14*: Since this room is being removed to construct the Interior Concourse, the existing ductwork (and terminal box, if present) will need to be removed, with the ductwork capped inside the east wall of the West Wing.

- *Exhaust Fan for Equipment Room W-78* (located on east side of West Wing, Level 1): The sidewall exhauster shall be replaced with a new exhaust fan and ductwork, since the existing fan exhausts into the future Interior Concourse; the existing fan cannot be reused in this scenario.

- *East Wing Handball/Squash Courts Air System* (located in East Wing basement mechanical room E-B2): Due to concerns over system capacities and operations, this air system will not be used to serve the new Steadward Centre (Level 2) and AIPAH (Level 3) that will be located where the Handball/Squash Courts; this system will be evaluated to determine if it can be refurbished to function as the air system serving the new Interior Concourse, with new ductwork installed to run through the basement and/or Level 1 ceiling space.

- *East Pool Chlorine Storage Room E-141* (located at SE corner of East Wing, Level 1): The exhaust louvre is currently located in an alcove next to Stair E-139YY that will be enclosed with the addition of the new PAW Centre immediately to the south; the exhaust louvre will be removed and the associated exhaust ductwork will run up to a vent hood on the roof; the additional ductwork will most likely require the existing exhaust fan to be replaced.

- *Lecture Room E-121C Air System* (located in mechanical room E-121A): The outdoor air intake louver is currently located in the west wall of Level 2 East Wing, which will be enclosed in the new Interior Concourse; the intake louver and outdoor air ductwork must be relocated to the roof above the lecture room or adjacent computer room E-121B, which will have an impact on the air system's capacity to draw in fresh air.

New air systems will consist of custom indoor air handling units. Each system will be sized to satisfy the peak design conditions and as a minimum will include supply fan, return fan, heating section, cooling coils, and air filters, return fans, and 100% airside economizers. Most systems will be fitted with variable speed drives and where appropriate, energy recovery devices such as heat wheels or glycol run-around coil systems will be provided.

The number of new air systems for the complex has been determined as follows:

- AHU-01a: Central Direct Dedicated Outdoor Air Deck System AHU (DOADS) c/w Enthalpy Wheel - (preliminary estimated size at 120,000 cfm)
- AHU-02: Concourse Ventilator AHU-01 c/w Enthalpy Wheel - (preliminary estimated size at 20,000cfm)

The Air system will be sized to satisfy the new PAW center as well as pickup the loads from the level 2 and 3 Van Vilet renovations. A computerized load model will be performed to accurately size the system capacities. A direct dedicated outside air system is proposed to be used in conjunction of localized CO2 monitors throughout the facility. The CO2 monitoring system will be utilized to measure air quality and will be interlocked to the DOADS system. The Outdoor air component of the AHU-01 unit will vary the amount of outdoor air to offset elevated CO2 levels. CO2 sensors will be zoned to satisfy LEED requirements for CO2 monitoring.

As an option to the traditional application of C02 monitoring via the usage of independent, localized sensors throughout the facility, an Aircuity monitoring system is recommended for review by the UofA. A sub report of the benefits of the Aircuity monitoring system is available upon request for consideration.

Conditioned air will be distributed throughout the facility using low velocity ductwork and digital terminal boxes complete with attenuator and reheat coils.

New Air System Utilizing Chilled Beam Option

The number of new optional air systems for the complex has been determined as follows:

- AHU-01B: Central Direct Dedicated Outdoor Air Deck System AHU (DOADS) c/w Enthalpy Wheel - (preliminary estimated size at 70,000 cfm) - Primary service to PAW center only
- AHU-02: Dedicated Outdoor Air System (DOAS) c/w Enthalpy Wheel - (preliminary estimated size at 20,000 cfm) - used with chilled beams – Primary service to Van Vilet only
- AHU-03: Concourse Ventilator AHU-01 c/w Enthalpy Wheel - (preliminary estimated size at 20,000cfm)

An alternative approach to the air systems is to split the consolidated DOADS system into two smaller units. The PAW center unit will be similar in configuration to AHU-01A at a reduced airflow of 70,000cfm and the second will service Van Vliet renovated spaces and will be a 100% ventilation complete with enthalpy wheel used in conjunction with chilled beams.

Chilled beams are gaining popularity in North America as a low energy solution for handling space energy loads by using water as the primary heat transfer fluid. This leads to an increase in efficiency for a number of the building systems, while still providing high levels of thermal comfort for occupants and adequate ventilation. The resulting energy savings are primarily due to lower fan energy requirements at the central air handling systems. Higher chilled water and lower hot water temperatures also provide further savings. Although a chilled beam system may carry an initial cost premium, the building over its operational lifetime should experience a significant net positive savings.

For budgeting purposes an approximation of 125 – 150 ft2 of area could be covered per beam depending on the latent and sensible load requirements within appropriate spaces. For an accurate estimate a space-by-space review should be conducted to acknowledge if chilled beams are suitable for a given space.

The beams do not have condensate drains on the coil; as such the latent loads within a given space are offset by the dry supply air to the beam. Therefore, dehumidification capabilities will be provided at the central air handling system to ensure the psychrometrics of the building are met and maintained. To further ensure these psychrometric conditions are met an evaluation and possible envelope remediation should be considered prior to applying chilled beams to the design criteria.

Renovated spaces currently serviced with existing air systems will be evaluated and retrofitted to satisfy new ventilation and exhaust requirements. Consideration to retrofitting existing system to incorporate energy recovery will be reviewed. Recovery systems such as glycol run around loop and pumping system, heat pipe technology or recent technologies such as the BKM reverse flow energy recovery system will be reviewed for their feasibility in the retrofit.

Exhaust from shower rooms, washrooms, locker areas are currently served by an existing supply and exhaust ventilation system. Specialized exhaust provisions for new kitchen and food services include dedicated make-up air units. Central exhaust systems will be fitted with heat recovery devices such as glycol run-around coil systems, heat-pipe systems or enthalpy recovery wheels where physical space permits gathering of ductwork to the air handling units.

Atrium/(Interior Concourse) Smoke Control and Specialty Electrical Co-Gen Provisions

The new concourse will utilize a smoke management system to adhere to the Alberta building code and NFPA 92A requirements. During a fire/smoke condition in an adjacent building, the new enclosed concourse (connecting the buildings) will incorporate HVAC systems designed to produce a positive pressure to mitigate smoke migration from one building into the next. In the event a fire/smoke condition occurs within the concourse, the concourse ventilation unit will deactivate and a dedicated smoke exhaust fan will activate to evacuate smoke in the facility. The exhaust fan may be interlocked to a low level louver/motorized damper assembly controlled by localized pressure sensors to maintain suitable pressure in the space. If temperature of the concourse drops near freezing, the ventilation unit may activate to offset a portion of the makeup air required. The smoke exhaust system may be manually activated by a localized fire department switch.

	Piping	Pipe Sizes (mm)	Insulation Thickness (mm)
1	Chilled Water Piping	15 to 65	25
	Plug Load (Chilled) Cooling Piping	75 to 150	40
	"Free" Cooling Piping	200 & over	50
2	Condenser Water Piping (Indoors)	To 25	25
		30 to 150	40
		200 & over	
3	Domestic Cold Water Piping	15 to 40	15
		50 & over	25
4	Domestic Hot Water Supply and Recirculation Piping	15 to 40	15
		50 & over	25
5	Glycol Heating Piping	15 to 40	25
	Glycol Heat Recovery Piping	50 to 75	25
		100 to 150	40
		200 & over	50
6	Hot Water Heating Piping	15 to 40	25
		50 to 75	25
		100 to 150	40
		200 & over	50
7	Refrigerant Suction Piping	All sizes	20
8	Roof Drains, Vertical Connections Below	All sizes	25
	Roof Drains and 3 m of Horizontal Piping		
9	Vents within 3 m of Roof Outlet	All sizes	25
10	Low Pressure Steam and Condensate	15 to 65	25
		75 to 150	40
		200 & over	50
11	High Pressure Steam	15 to 30	25
		40 to 75	40
		100 & over	50
12	Condensate Tanks Blow Down Tanks	All sizes	50

To further enhance the Near-Zero energy approach of the Interior concourse, the electrical energy related to power distribution, lighting and mechanical equipment may be produced by the utilization of a steam turbine generator. The steam turbine generator uses waste steam from the steam PRV station to power a generator. The electrical subsystems required for this co-generation plant is described under the electrical schematic design subsection in this report. The proposed steam turbine generator will be a self contained packaged unit that will produce a range of 100kW-300kW of energy by utilizing otherwise wasted energy during the steam pressure reduction process of a PRV station. Utilizing this system in conjunction with the other provisions for heating will promote minimal energy consumption of the interior concourse. The Co-Gen steam generator will be further investigated if considered a desired and viable component to the project.

Community Kitchen Exhaust
The Community Kitchen will be roughed-in for kitchen equipment provided by others. Traditional connections will be made for sinks, dishwashers, refrigerators, exhaust hoods and etc. The kitchen equipment requirements will be coordinated with the kitchen supplier for all equipment. Additional Provisions for the new Community Kitchen include a grease interceptor for sanitary drainage and UL762 rated kitchen hood exhaust. The Community kitchen will be provided with a gas service that will include a primary emergency shut off solenoid that interlocked to the fire alarm system.

	Ducts	Insulation Thickness (mm)
1	Combustion Air and Relief Duct	50
2	Exhaust Ducts Within 3 m of Exterior Walls or Openings	25
3	Outside Air Intake Ducts and Plenums	50
4	Ductwork Exposed to Outdoors	50
5	Ductwork Exposed to Outdoors with Acoustic Lining	50 (Acoustic)
6	Plenums (Heating Systems)	50
7	Plenums (Systems with Cooling Coils)	50
8	Supply Ducts (Heating System)	25
9	Supply Ducts (Heating/Cooling System)	25
10	Supply Ducts Ventilation Systems	25
11	Ventilation Equipment Casings	25
12	Acoustic Lining (where indicated)	25 (unless indicated otherwise)
13	Boiler Breeching	50

PIPE AND DUCT CONSTRUCTION AND INSULATION

Pipe Work

Heating piping systems shall be designed to ASHRAE standard with heated water velocity at 3 to 4 feet per second. Heating pipe material shall be steel to ASME standards. Steel SCH80 welded 65-mm and larger and screwed up to 50-mm. Copper piping will be utilized for smaller branch lines. Domestic hot and cold water piping shall be copper, plastic (polypropylene) or stainless steel. Sanitary and storm sewer piping shall be a cast iron/copper above grade and plastic pipe underground. Pipe and duct insulation thicknesses shall be specified to meet MNECB and ASHRAE 90.1 standards. All heating and domestic water piping will be insulated throughout, including recirculation lines. Storm sewer rainwater systems will be insulated for the first 3m from the roof drain and all horizontal runs within the building.

Ductwork

Duct systems shall be designed to meet or exceed SMACNA standards. Duct velocities will be limited to medium-low velocity range. Higher gauge duct construction will be used at locations identified by the acoustical engineer. All fire dampers or combination fire/smoke dampers will be dynamic type, and they will be placed at duct penetrations between fire/moke zones.

VIBRATION ISOLATION AND ACOUSTICS

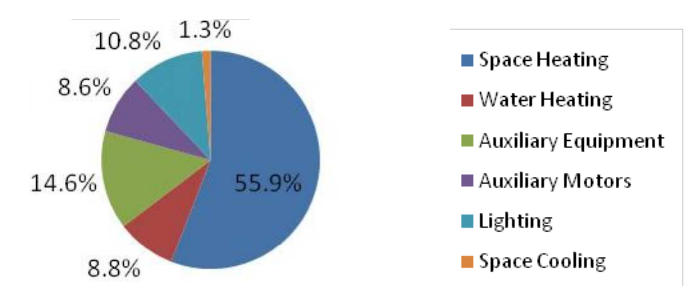
All mechanical equipment will utilize vibration isolation to mitigate vibration/ noise transfer to the building. Mechanical room equipment will be mounted on a minimum of 100mm equipment pad. Air handling units will be fitted with motor inertia bases and integrated silencer sections. Where integrated silencers are space prohibitive, duct silencers or attenuators will be utilized. Terminal air boxes will include attenuators from the manufacturer, and other ductwork where sound transmission is not desired will be fitted with acoustic lining.

HVAC CONTROLS

The facility will be equipped with a complete digital control system that will control all elements of the mechanical system and integrate with the existing building automation system. The control system will also interface with the lighting control elements such that lighting control can be programmed and scheduled by the Building Automation System (BAS). The BAS will be equipped with trending software such that system parameters can be measured and trended over time. This will facilitate the analysis of energy initiatives and offer historical data of the performance of the systems. Remote alarming including dial out to "on call" operators will also be provided.

Occupancy sensors will be utilized in spaces to reduce energy requirements during unoccupied periods. Ventilation systems will minimize the use of outside air for CO2 control by the use of CO2 sensors.

DDC control of systems will enable exhaust fans and ventilation air units to shut down during unoccupied periods. An unoccupied space temperature setback system will be incorporated to lower room temperatures. On night cycle, the fan systems will be off and room temperatures will be maintained at night setting by the hot water heating system. Controls in the ventilation supply system will allow rest of the mixed air temperature to minimize the amount of air tempering.



Control actuators will primarily be digital electronic type with the exception of actuator operators used in primary air handling systems which will be pneumatic. Compressed air services are from the utilities corridor will be regulated down and used for pneumatic control equipment and accessories. The control system will complement the existing UofA BAS.

ENERGY CONSERVATION AND SUSTAINABILITY MEASURES

Cursory Energy Projections and Energy Conservation Strategies

Hemisphere has performed a preliminary energy review for the Physical Activity and Wellness (PAW) facility based on preliminary space programming areas. The following summary will help describe the results of our cursory estimates.

Please consider that the following cursory results are order of magnitude projections (within 25% accuracy) and are subject to change as the project progresses based on actual building construction and components. The following energy review should be considered to provide order of magnitude for dollars saved as a result of measures to reduce energy consumption as well as define targets and strategies to energy conservation. An energy model will be required to provide more accurate estimates in energy reductions and operational cost savings following completion of design.

We have used the following assumptions and references to perform this review:

- Alberta Govt. Utilities Consumer advocate Website Historical Rate Summary
  weblink: http://www.uucahelps.gov.ab.ca
  Date: December 1st, 2010
  Electricity Rate = 6.732 cents/kWh
  Natural Gas Rate = 4.045 dollars/GJ
- Natural Resources Canada Comprehensive Energy Use Database Tables Commercial/Institutional Sector – Alberta
  weblink: http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/trends.com.ab.cfm
- Average Electricity Shares % of Total Energy Consumed = 35.3%
  Average Natural Gas Shares % of Total Energy Consumed = 64.7%
  NrCan 18 year average energy Intensity (AB Recreational Facilities) = 1762 MJ/m^2
- PAW Center New Construction and major renovation areas gross area = 150,000 ft^2

It can be seen that space heating and water heating comprise 64.7% of average energy consumption with Lighting and Auxiliary Equipment comprising 25.4% of average energy consumption. The four energy shares total to 90% of average energy consumption for recreational facilities and thus should serve the basis of focus on applying energy conservation methods.

Percent Reduction per Energy End Use		
	Case 1	Case 2
Space Heating	25%	50%
Water Heating	20%	50%
Auxiliary Equipment	10%	20%
Auxiliary Motors	10%	20%
Lighting	10%	30%
Space Cooling	20%	20%

Energy Conservation Strategies and Projected Savings

- Representative Case 1 ECM Considerations:
  - ASHRAE 90.1/MNECB Equipment baseline requirements for efficiency, envelope and insulation Climate Zone 7.
  - Airside Heat Recovery.
  - Efficient plumbing fixtures.
  - Premium motors and usage of Variable Frequency Drives.
  - 100% Airside Economizers.
  - Energy star rated receptacle loads (Auxiliary Equipment).
  - Efficient Lighting design
  - Setback controls
- Representative Case 2 ECM Considerations:
  - Case 1 ECM's Plus:
  - Enhanced application for improved ASHRAE 90.1/MNECB Equipment performance for efficiency, envelope and insulation Climate Zone 7.
  - Condenser loop heat recovery via AHU's.
  - Dedicated outside air distribution system and/or demand controlled ventilation.
  - Ice plant chiller condenser side recovery for space heating of the concourse.
  - Solar hot water heating for generation of domestic hot water along with high efficiency low flow plumbing fixtures.
  - Steam Condensate Preheat for DCW.
  - Mechanical window shades interlocked to building controls.
  - Extensive reduction of lighting densities and design.
  - Extensive usage of Energy Star rated equipment for most user equipment (Auxiliary Equipment).
  - Occupancy driven controls.
  - Chilled Beams or DOAS Equivalent system.
  - Electrical Co-Generation at steam PRV Station using Steam Turbine Generators.

Please consider that at this early stage of evaluation that the following cost percentage savings are not representative savings against either MNECB or ASHRAE 90.1 and is a representative savings against the average of all similar types of faculties as recorded by NrCan in Alberta over the last 18 years. Caution is advised not to draw direct parallels at this time to application to LEED points as further studies using detailed energy models will provide better metrics for attaining respective LEED points in the near future.

Case 1 demonstrates modest reductions in each area and reflects an overall estimated reduction in energy costs of approximately $25,000/yr (~15%). Case 2 includes significant reductions in Space Heating, Water Heating, Auxiliary Motors and Lighting and reflects an estimated cost savings approximately $50,000/yr (~30%).

CLOSING REMARKS AND ECM RECOMMENDATIONS

Space Heating

- Targeting a 50% space heating reduction will not only require heat recovery provisions, but also require a high performance envelope which will aid in the reduction of mechanical heating and conditioning provisions for the facility. Consideration to upgrading the building envelope of renovated areas should be considered. Wall construction overall performance should be a minimum of R-30 and Roof's R40. Fenestration overall performance should use triple pane low e glazing as a baseline for consideration for curtain wall applications.
- The usage of air side and water side recovery in the facility will also reduce the overall energy consumption. Consideration to the usage of chiller plant condenser water recovery for the use of concourse heating should be considered.
- Due to the high volume of air that will be exhausted from the facility, heat recovery will be incorporated.

Water Heating

- The PAW Center change/locker room's facilities will be expanded in close proximity to the existing facilities. Due to the nature and function of the facility, the usage of low flow lavatories and showers will have a positive impact to the usage of domestic hot water. The existing facility is currently serviced with two existing domestic hot water tanks located in the basement of the west wing pool and east wing pool, and east wing mechanical room. A new domestic hot water plant heater sized to handle the entire facility is proposed to replace the dated, existing plant. This will allow cost benefits related to economies of scale and the opportunity to integrate provisions for solar hot water heating to further reduce the energy required to meet the requirements.

Space Cooling

- Implementing the use of 100% economizers, plate and frame heat exchangers and centrifugal separation filters can be utilized to mitigate premature heat exchanger and coil fouling, and thus maintaining the exchanger efficiencies and longevity of the coils.
- Due to the high volume of air that will be exhausted from the facility, heat recovery will be incorporated.

Ventilation

- Optimizing outdoor air loads will have a direct impact to the fan, heating and cooling energy utilized by the system.
- Implementation of a DOADS air system for the PAW center and a chilled beam DOAS system for the renovated spaces (in lieu of traditional VAV terminal boxes) will allow the reduced airflows described and energy can further be reduced when used in conjunction with a scalable air monitoring system allowing the optimization of energy utilized in conditioning outdoor air.
- Implementation of airside heat recovery such as glycol run around pumping loops, heat pipes or BKM energy recovery products.

Auxiliary Equipment (Receptacles)

- Energy star equipment.
- Manual switchable receptacles to reduce parasitic energy consumption in offices/classrooms.

Auxiliary Motors

- Utilize Premium efficiency motors.
- Variable Frequency Drives.

Lighting

- Considerations for the usage of efficient lighting technologies such as: T5/T8/LED lighting, day lighting, occupancy controlled lighting, and integration of internal/external shading can help achieve reduced lighting densities without degradation of lighting requirements for the facility. Additionally, lower lighting densities also have a direct effect on the sizing of HVAC equipment and systems. Coordination with the electrical consultant and the Architect/University will be required to establish lighting densities targets to improve upon the minimum MNECB minimum densities listed below.

Interior Concourse Near-Zero Energy Consumption Considerations

- Low grade heat from adjacent arena chiller plant to provide heating distributed by an in-slab heating system.
- Implement a solar hot water heating plant to produce heated glycol for Concourse AHU heating coils.
- Utilizing steam co-gen for producing electricity for Interior Concourse HVAC, lighting and receptacles.
- Displacement ventilation distribution of ventilation air as space conditions allow

8.0 ELECTRICAL

The University of Alberta's Van Vliet Physical Education and Recreation Centre (V V C) is a blend of original, expansion, addition and renovated spaces. It has undergone various electrical system upgrades and modifications over its life span as well. The following will summarize the existing electrical system conditions for the Universidad Pavilion and the V V C which will include the Distribution Switchgear, Motor Control Centres (MCC's), Emergency Power, Fire Alarm System, Lighting, Data / Voice System and any Specialty Electrical Systems. Topics of discussion are limited to those systems and spaces that will be impacted by the proposed construction of the new Physical Activity and Wellness (PAW) Centre and the renovation of adjoining spaces.

Recommendations for the construction of the new PAW Centre will be discussed in the latter part of this section. Further detailed site investigation is ongoing to assist in supporting the design strategies that are recommended in this report. Consultation with all stakeholders including user groups and maintenance staff will be documented and considered when detailing major design elements of the proposed new facility to ensure that the centre will meet the functional needs of current and future occupants. All design strategies will comply with the University of Alberta – "Design Construction Standards and Guidelines" and will be confirmed with user groups during detailed design meetings.

Electrical systems will be designed on the basis of high energy efficiency. Design strategies for lighting control, HVAC interfacing and renewable energy sources (Solar Photovoltaic Energy System and Steam Turbine Generator) will be discussed in the recommendation portion of this section in support of achievement of LEED Silver accreditation.

EXISTING ELECTRICAL SUPPLY

The existing sub-electrical service equipment that feeds the V V C is manufactured by Federal Pacific Electric (FPE), 1970 and is located in the lower level of the Van Vliet Center. There are two separate electrical 13.8kV feeds from the upstream central plant source which each feed one 1000kVA distribution transformer, (T1 or T2). The distribution system was originally designed and installed to provide power redundancy in the case of a power outage from either primary feed, with both busses being interlocked with a 15kV tie disconnect switch (TD1). Also, in the event that T1 or T2 transformer fails there is a secondary 600V tie disconnect switch (ST1) and a secondary 208V tie disconnect switch (ST2) downstream to allow either transformer T1 or T2 to supply power to both sides temporarily. Transformer T1, is 1000kVA rated, 13800/(600/347)V and feeds the 1200A, 600/347V 3 phase load bus. Transformer T2, is 1000kVA rated, 13800/(208/120)V and feeds the 3000A, 208/120V 3 phase load bus. The two busses are connected to each other through ST1 from the 600V bus into a 750kVA tie transformer and then into ST2 which is connected to the 208V bus. Both buses have an interrupting capacity of 100kArms on the secondary switchgear side of T1 and T2. From this switchgear V V C electrical panels are fed.

The Pavilion is fed from a similar distribution arrangement, where incoming 13.8kV enters the electrical room and is stepped down to 600/347V with a single 1500kVA transformer. Local 208/120V panels are fed from separate step down transformers.

EXISTING SECONDARY POWER DISTRIBUTION / ELECTRICAL LOADS

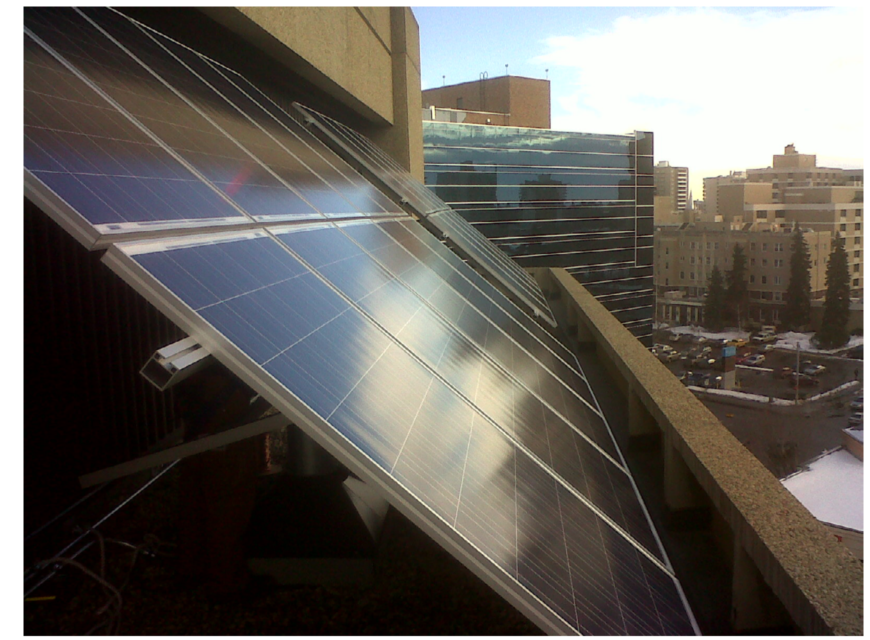
Existing service equipment and building Motor Control Center's (MCC) are located throughout the facility in separate electrical / mechanical rooms. Electrical Room E-25 in the lower level of the V V C East Building houses a central distribution panel rated 1000A, 600/347V, 3 phase which feeds various 120/208V panels, MCC's, elevators and snow melt equipment. The MCC is located in the main mechanical room of the East Building in room EB-2, which is already at capacity with only five (5) available spaces (305mm space factor each) currently.

EXISTING STAND-BY EMERGENCY POWER

There is an existing 150kW, 600V natural gas fired emergency generator installed in the electrical room on the third level of the pavilion that serves only the emergency loads for the Pavilion.

Also, there is a 45 kW, 208V natural gas fired emergency generator installed in V V C East Building that serves the emergency loads for both the East and West Buildings.

Existing loading on these generators will be further documented during detailed design. The ability of these units to accommodate new additional loads will be determined at that time.



Flat Roof Installation

Photovoltaic Module Shades

Photovoltaic Window Awning

GENERAL ELECTRICAL SYSTEM CONDITIONS

The majority of the normal power, emergency and exit lighting systems appear original vintage to the construction era of various areas of the centre. Some areas have been provided with new fixtures where the space has undergone renovation or repurposing. Most of the existing building areas that will be impacted by the new construction are fitted with vintage fixtures that will be considered for replacement under this scope.

It is anticipated that the majority of the existing power distribution in the impact areas is either at the end of its serviceable life span or not capable of accepting new load demands. Where possible, elements of the existing distribution will be retained and reused with new equipment provided in support of the new floor plan.

The existing communications infrastructure throughout the V V C will be utilized to provide services to renovated spaces. Fibre optic cable currently provides a communication link, campus wide, between buildings via the underground service corridors. The V V C facility is provided with copper and fibre optic internal communication network between various control/ termination locations throughout the centre. Renovated space cabling requirements will be reviewed with the U of A Facilities and Operations management for integration into the current infrastructure.

RECOMMENDATIONS FOR CONSTRUCTION OF THE PAW CENTRE

Power Distribution System

The existing V V C medium and low voltage switchgear is in satisfactory condition; however the majority of the equipment is nearing the end of its serviceable life span. It is currently being considered for replacement by the university outside of the scope of this project. Project scheduling will need to be considered during the construction phase of this project to ensure that no conflicts develop.

We recommend that a new 13.8kV, medium voltage service be provided to the PAW Centre.
The new medium voltage 13.8kV sectionalizer and single transformer substation would be located in separate electrical rooms in the new basement at the service corridor level. A third electrical room would then house the 600/347V panel boards, Motor Control Centre (MCC) and 208/120V distribution equipment to supply all new building loads, refer to sketch ESK-01 found in the Appendix of this report for the Proposed Electrical Room Layouts. Further consultation with university electrical staff will be required to determine the optimum routing of the new service conductors from the service corridor. The final configuration and layout of these service spaces will be further explored in the design development phase. Refer to sketch ESK-02 for the Proposed Power Distribution Single Line Diagram and sketch ESK-04 for the Proposed Power Distribution New Service Corridor found in the Appendix of this report.

It is intended that repurposed areas within the existing building footprints remain serviced from the power distribution infrastructure that is currently in place. New panelboards will be provided in areas where the existing are insufficient or unsuitable for reuse.

Construction power will be fed via a temporary portable substation, which will be provided by the University. Existing building electrical systems will not be used to serve as construction power.
Power Factor Correction / Harmonic Mitigation
Power factor correction systems will be considered during the design phase to correct the electrical installation operating power factor to 0.95 or greater. Utilization of high efficiency mechanical equipment loads will decrease the requirement for power factor correction equipment.

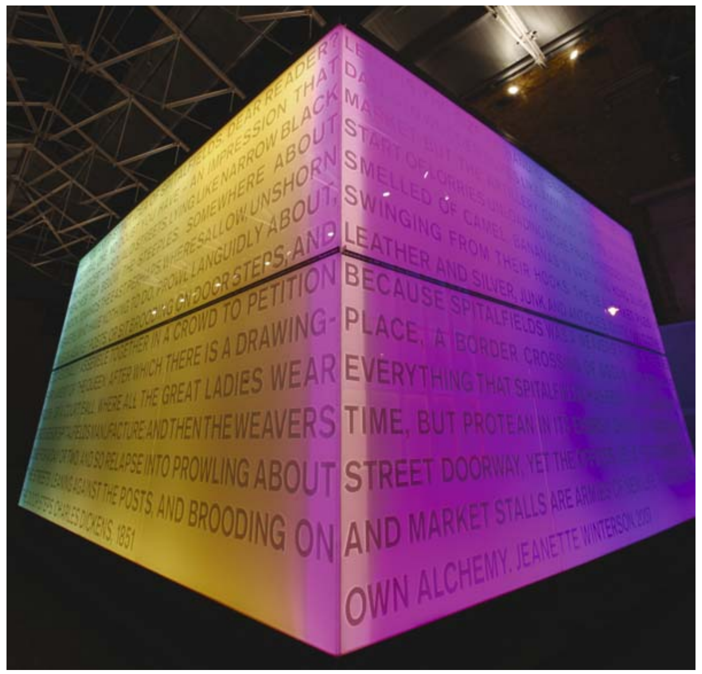
The use of VFD controllers on mechanical equipment loads may contribute to the introduction of harmonic currents on the electrical distribution system. The proposed method of harmonic mitigation/power factor correction will be by Active Filter units, sized upon harmonic analysis. Once the facility is in operation the University will conduct a harmonic analysis which will determine the order of each harmonic in the electrical system in compliance with IEEE 519 standards for acceptable harmonic contributions. The acquired data will then be used to fine tune the design harmonic mitigating active filter(s) specifically for the application. Active filtering will take place at the 600V MCC/Switchgear level.

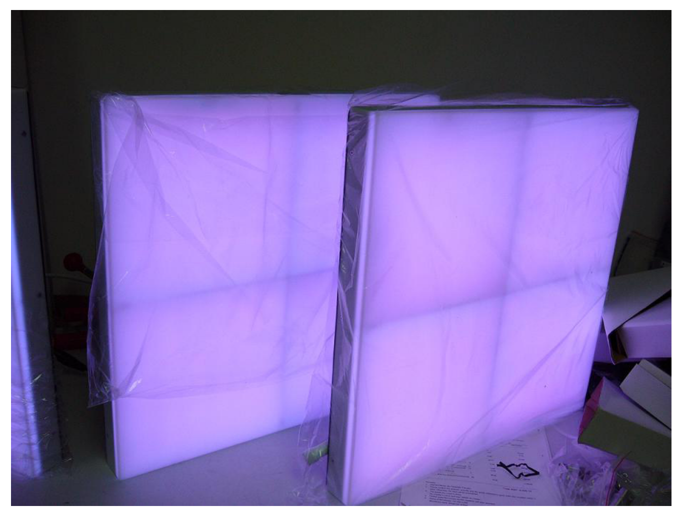
Emergency Power

The design of a new emergency power system is to be discussed and finalized during detailed design. Emergency power may be provided via battery backup or diesel powered stand-by generator. Collaboration with University staff will be required determine the most appropriate methodology for the project.

Grounding

A complete new grounding system will be designed and installed in accordance with Canadian Electrical Code – 2009 (CEC) and university design guidelines. New ground grid will be properly placed to ensure proximity to existing grounding grids will not create an unsafe installation. All new metallic piping systems will be bonded to new building ground as per required by CEC.





LED Lighting

Conduit and Conductors
Interior wiring will be installed as a combination of insulated wiring in rigid steel conduit or electrical metallic tubing; depending on the application. Rigid PVC conduit will be utilized under concrete floors. Rigid steel conduit will be used in all non-corrosive atmosphere locations where mechanical damage may occur, in all process and mechanical room areas to a height of one meter above floor level, as well as in all hazardous classification areas. Rigid aluminum conduit will be used in all wet or corrosive atmosphere areas where exposed conduit is required (epoxy polyester coated rigid steel conduit may also be used for this application). Electrical metallic tubing (EMT) will be used as a raceway in dry areas for surface or concealed wiring. Use of EMT will not be permitted in damp locations, corrosive or hazardous classified areas, underground installations, or exterior applications. Hazardous location (HL) TECK may be used in hazardous classified areas (ie. Chlorine Rooms) in lieu of rigid steel conduit and wire, depending upon the specific application. Minimum size of conduit is 19mm.

Wiring for the facility will utilize a combination of RW90 600V insulated copper wire (minimum wire size #12 AWG) installed in conduits, BX-Type for light fixture terminations, possibly flexible armoured type TECK 90 1000V rated copper cables in cable trays and specific jacketed VFD cable 1000V rated cables in cable trays. Although all wiring will be sized in accordance with the requirements of the Canadian Electrical Code. Consideration will be given to the installation of oversized conductors in selected applications to reduce losses and provide future system flexibility.

Lighting
Lighting throughout the existing building areas that will undergo renovations/upgrades will be evaluated on the basis of age, efficiency and suitability for reuse. Where practical, newer fixtures will be retained and reused. Where necessary, new fixtures will be provided in accordance with the university standards. All new building lighting systems will be designed to operate at 120Vac fed from dedicated lighting panelboards. Where new fixtures are provided in renovated spaces the existing lighting circuit voltage will be maintained to avoid confusion.

Lighting for the new areas will be provided taking into consideration such elements as ceiling type, mounting height, area classification, and will provide the required illumination performance for the specific usage within all areas. Luminaires will be located to provide optimum performance as well as to ensure access for maintenance. Lighting levels will be designed in accordance with the Illuminating Engineering Society of North America's (IESNA) recommendations for all areas. Lamp sources will be selected to meet specific design criteria for all areas. Linear fluorescent T8 or T5HO lamps are preferred for the majority of interior applications based on lighting performance and lamp life considerations. The proposed lamp color temperature that will be used is 3500°K throughout the facility for consistency.

Ballasts for fluorescent luminaires will be rapid start electronic type with low harmonic distortion rating (less than 10% THD). Compact fluorescent plug-in or screw in style will be used in areas where linear fluorescent fixtures are not practical. Incandescent lamps will not be considered unless required for a specialized task. All new fixture types and styles will be designed in accordance with U of A Lighting Design Guidelines and Standards. Specialized lighting applications that have not been detailed in current university standards will be proposed for approval as specialty alternates to the stakeholders prior to finalizing design.

LED lighting is gaining in popularity as a suitable and highly efficient source for general and specialized space lighting. The PAW Centre will feature spaces that could be well suited for an LED lighting application. It is proposed that, with input from university staff, LED lighting be used to provide a form of accent lighting of the climbing structure. Further research and discussion will be required during detailed design.

Lighting control will be provided in accordance with LEED design principles. Individual control of small office or area lighting will be provided via occupancy sensor/switches. Frequently unoccupied spaces such as lunch and change rooms will also be provided with occupancy sensors. Daylight/dimming sensor control may also be utilized to take advantage of any rooms with large windows directly to the exterior of the building. It is proposed for all new lighting to be interfaced with the building automation system (BAS) via low voltage relays to provide programmable control interface with HVAC. Low voltage lighting control will also provide efficient multi-level switching to vary space lighting levels depending on occupancy and function.

Court areas
These areas will be illuminated using linear fluorescent fixtures with either T5HO or T8 lamps depending on room size, room height and type of sports being played on the designated courts. All fixtures will be installed with lamp guards or impact resistance lenses. IESNA recommends light levels ranging from 200 lux to 750 lux for the various sports that may be played within the court area.

Fitness / group activity areas
These are the areas that will be used for pilates/yoga/aerobics/dance/individual workouts. The rooms will be illuminated using linear direct/indirect fluorescent fixtures with T5HO or T8 lamps depending on room size and room height. IESNA recommends light levels of 300 lux.
Climbing centre

The lighting in this area will be designed using primarily indirect sources to provide improved visual comfort and glare control. Consideration will also be given to the use of an integrated LED wall panel system to provide the space with a uniform low level diffused light source. IESNA recommends light levels of 200 lux horizontal and vertical. This and other options for LED application will be further investigated during detailed design.

Social street / concourse
These areas will be illuminated using either linear fluorescent fixtures with T5HO lamps or High Intensity Discharge (HID) fixtures with metal halide lamps. Fixture types in this area are considered specialty fixtures, and as such will be chosen with University staff input. Fixtures installation along the new concourse will utilize the structural concourse column; refer to sketch ESK-03 Social Street Concourse Lighting Distribution and lighting specification sheets found in the Appendix of this report. IESNA recommends light levels of 300 lux.

Common areas
Areas such as offices, conference/meeting rooms, lockers, service rooms and open work areas will be provided with linear fluorescent fixtures with T8 lamps. As these rooms vary in size and application, fixture styles will also range from recessed, suspended, wall mounted or direct/indirect fixtures. All light levels will be designed as per IESNA recommendations.
Exterior
Exterior man doors for building entrances/exits will be illuminated from building mounted luminaires. Exterior plaza areas, walkways and any parking areas will be illuminated from site pole lighting. All exterior luminaires will be dark sky compliant cut-off style to limit light trespass and visual glare. Building mounted exterior lighting will be controlled via photocell with an override by-pass feature incorporated in the low voltage lighting system. Site lighting will be fed via service corridors and tied into the existing 120/208V campus lighting system, as per University guidelines.

Emergency and exit lighting
Exit signage will be provided throughout the various areas in accordance with governing code requirements. Proposed units will be the universal mounting type, aluminum construction for durability with high intensity LED style lamping to minimize energy consumption. AC Powered during normal operation with internal batteries for emergency situations.

Emergency lighting provisions will be dependent on the selected emergency power supply source for the facility. A DC battery operated power source solution would require the use of emergency battery packs with remote lamp heads along with selected AC luminaires powered via internal battery back-up. Should an emergency generator be the selected, the emergency power distribution would feed local EM panelboards that service selected AC luminaires to provide adequate lighting for egress purposes and to comply with life-safety standards during a normal power failure.

Voice / data system

New data and voice cabling infrastructure system will be provided via a Category 6 certified system consisting of termination racks, Category 6 cabling to the outlets and a fiber optic backbone cabling system.

The telephone system is to utilize VoIP technology, to allow all telephones to be connected on the same network as the data system. Telephone and data services are to be connected to the existing network infrastructure at 2 of the Universities core locations. Method of connection to these existing network points will be determined during detailed design.

All workstation locations will be provided with data and voice outlets. Fax machines, copier location will also be provided with data and voice outlets to allow direct printing and faxing from workstations outlets.

Detailed design will confirm if existing telephone services installed in the buildings to be renovated will provide the required infrastructure to accommodate the upgraded layouts. Currently existing underground main telephone services enter into the north side of VVC, north side of university hall and south side of physical education extension east building.

The allowance of payphones will be discussed with the university; it is proposed to install minimal number of payphones as the majority of people utilize cellular phones.

AICT Telecom and Data Services shall be contacted during detailed design for specific details.

Fire alarm system

The new fire alarm system will consist of an addressable, zoned, single stage, non coded control panel, initiating and signaling devices as required by Alberta Building Code and NFPA requirements. Manual pull stations will be located at all required exits and egress to exit locations. Automatic initiating devices such as heat detector, smoke detectors will provided in all stairwells, corridors, service rooms as required by NFPA standards. Use of VESDA style initiating systems will be investigated for areas of high or pocketed ceilings. Signaling device shall be a combination audible and visual device. A temporal horn and a strobe light will be located at spacing interval to meet the audibility requirements of CAN/ULC S524-M97, Standard for the Installation of Fire Alarm Systems.

The new fire alarm control panel will be located in an easily accessible location for the fire department and will be interconnected to the existing main fire alarm control panel which is located in electrical room E-25. Alpha numerical annunciators may be located in several key areas, including the reception desks, fitness centre, general staff occupied areas and other designated areas.

Renewable energy systems
Photovoltaic (PV) system technology is rapidly evolving and is now being integrated directly into some building roofs, envelopes and surrounding spaces. PV arrays collect the suns energy and convert that energy into usable electricity that can then be fed onto the local building power grid. During detailed design a cost payback analysis may be done to determine an appropriate size array that would be feasible for the PAW project. The current market price of an installed PV system is in the range of $6-7 per Watt. Provision of a PV array would contribute to the green footprint of the building and provide an educational opportunity for occupants. Further investigation will determine the possibility of outside source funding to assist in procuring a PV system for this project. Refer to sketch ESK-05 found in the Appendix of this report for an Example PV System Single Line Diagram, to help understand the physical properties of the system.

In collaboration with the mechanical design team the usage of a steam turbine generator may be further investigated during detailed design, to provide usable electricity from waste steam/heat. The waste steam pressure can be reduced through the steam turbine to produce useful shaft power to drive a generator and create electricity. During detailed design a cost payback analysis may be done to determine an appropriate size generator that would be feasible for the PAW project.

Mechanical Equipment Wiring
Motors 1/2 HP (0.373kW) or less to be 120 Volts, single phase, 60 Hz. All motors 3/4 HP (0.56kW) and greater to be 600 Volts, 3 phase, 60 Hz. Servicing of motor loads at 600 Volts is recommended over service at 208 Volts in order to minimize conductor and conduit sizing. Motors will be supplied and installed by the mechanical trade. Power feed, unit mounted disconnect and all terminations will be done by the electrical trade.

Full voltage, non-reversing combination magnetic motor starters will be utilized for all motors 3/4 HP (0.56kW) and greater. Variable frequency drives will be provided by the mechanical trade if separate units are required for HVAC loads. University provided VFD master specification, revision #10, will be incorporated into consultants' construction contract specifications to ensure new VFD's provided will comply with current University standards.

It is recommended a new motor control centre (MCC) is to be provided for the new building mechanical equipment loads. New HVAC loads in existing / renovated spaces will be serviced via existing electrical infrastructure where possible. The new MCC will be constructed in accordance with NEMA Standards, Class I, modified Type B with control wiring and control terminals for each module and control wiring extended to control terminal section of the MCC.

Mechanical loads
The preliminary estimated HVAC loads are as follows:

Pumps: 160HP @600V
AHU: 250HP @600V
Fans: 32HP @600V
A/C: 130A @208V

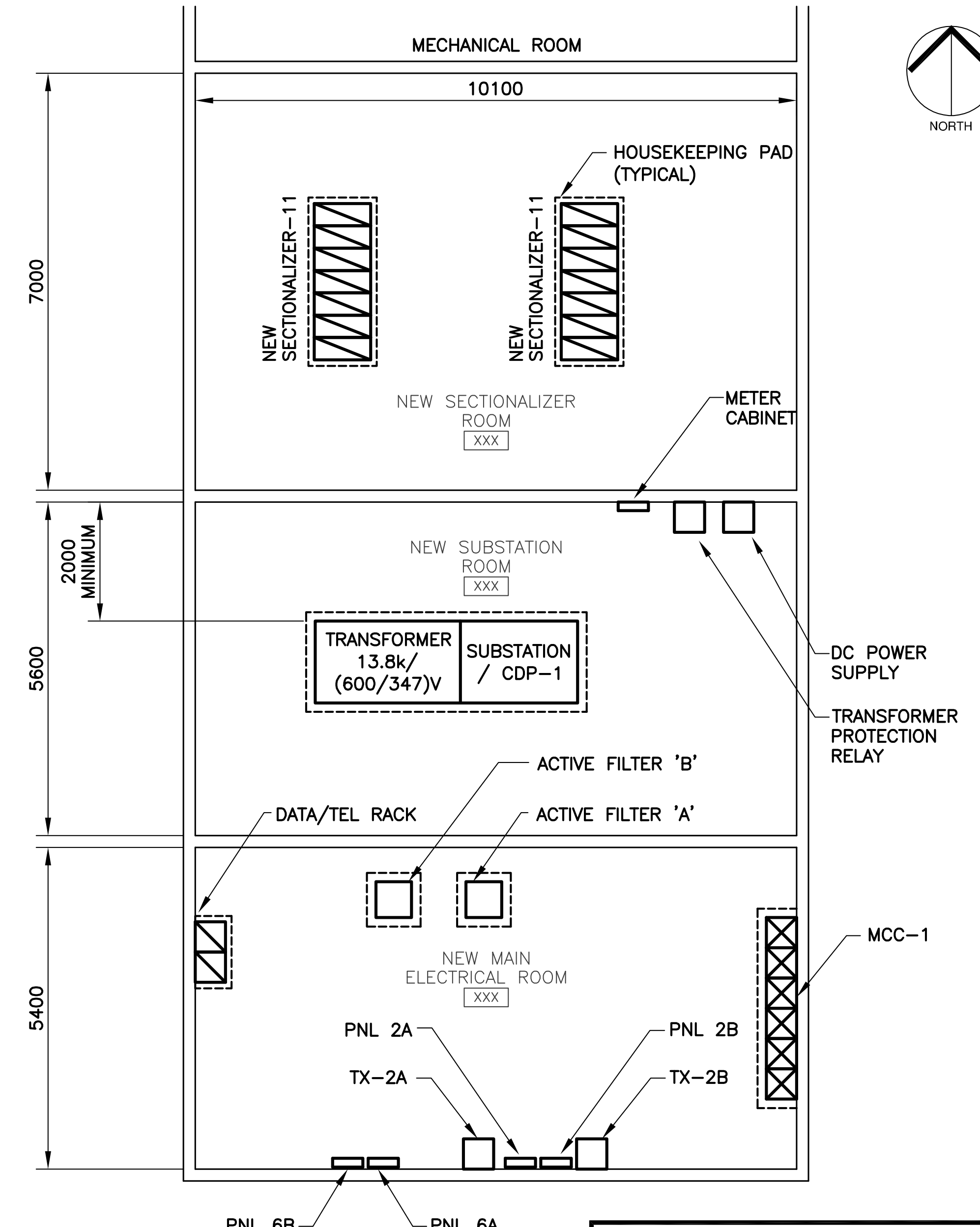
Incorporating demand factors the estimated peak demand for mechanical HVAC loads is 350kVA.

SPECIALITY APPLICATIONS

Mechanical / electrical rooms
Painted plywood backboards will be installed on all walls of new electrical rooms. A minimum of one (1) emergency powered receptacle will be installed in each mechanical and electrical room. All conduit penetrations shall be oversized for future addition of cabling/conduits and firestop sealed.

Card access control / security system
The University Access Central System (UAAC) is to complete a risk analysis from the proposed building plan to determine the requirement for access control and security systems. Consultant will work with UAAC Design Co-ordinator in developing access/security layouts during detailed design. ACS Services shall be contacted during detailed design for specific details.

Cable television system
As per university design guidelines required cable TV infrastructure distribution will be done via service corridor system. AICT Services shall be contacted during detailed design for specific details.



NOTES:

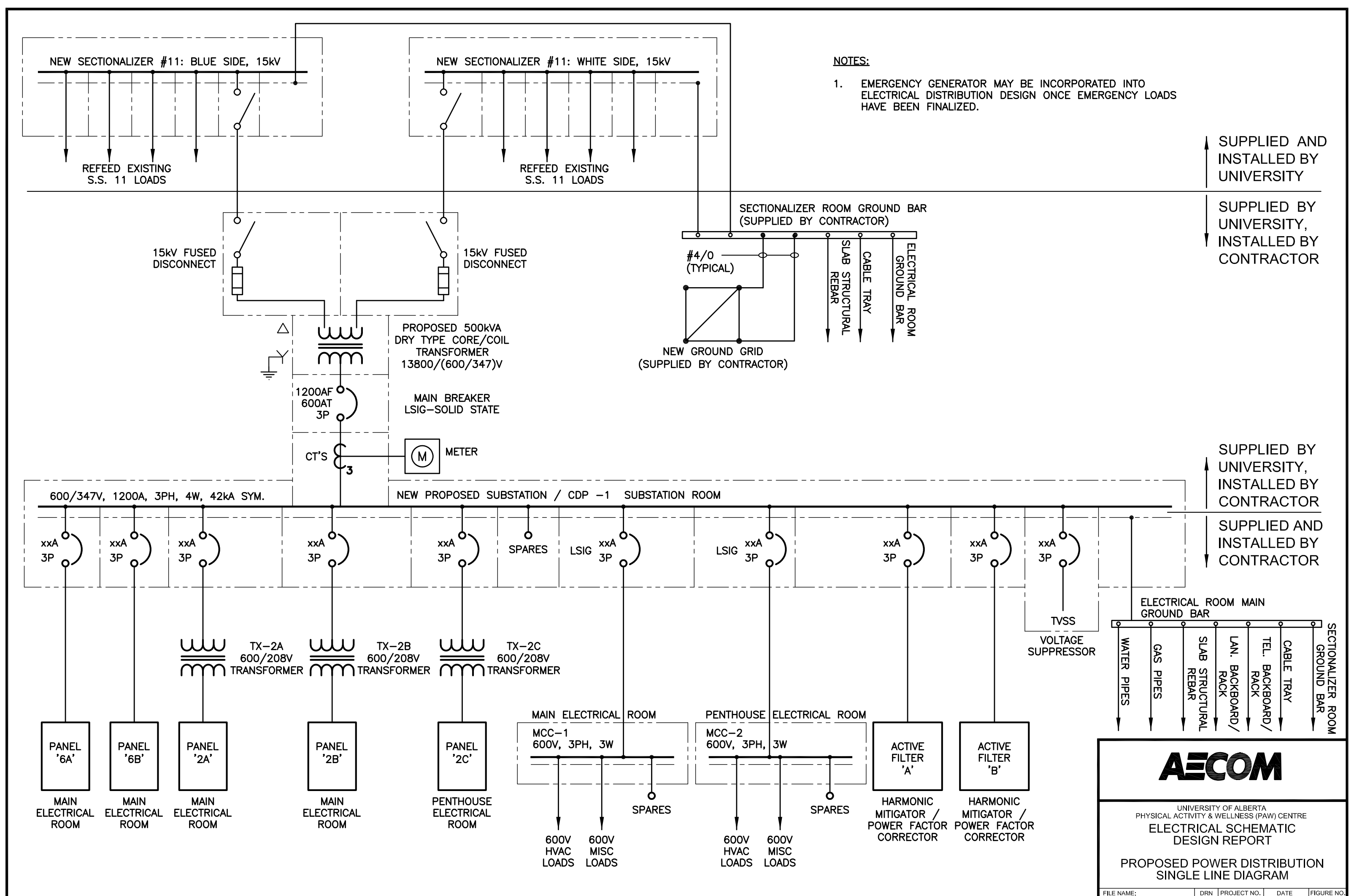
1. NEW SECTIONALIZERS ARE TO BE SUPPLIED AND INSTALLED BY UNIVERSITY CONTRACTORS.
2. ELECTRICAL EQUIPMENT SHOWN IN NEW SUBSTATION ROOM IS TO BE SUPPLIED BY UNIVERSITY, INSTALLED BY ELECTRICAL CONTRACTOR.
3. ELECTRICAL EQUIPMENT SHOWN IN NEW MAIN ELECTRICAL ROOM IS TO BE SUPPLIED AND INSTALLED BY ELECTRICAL CONTRACTOR.

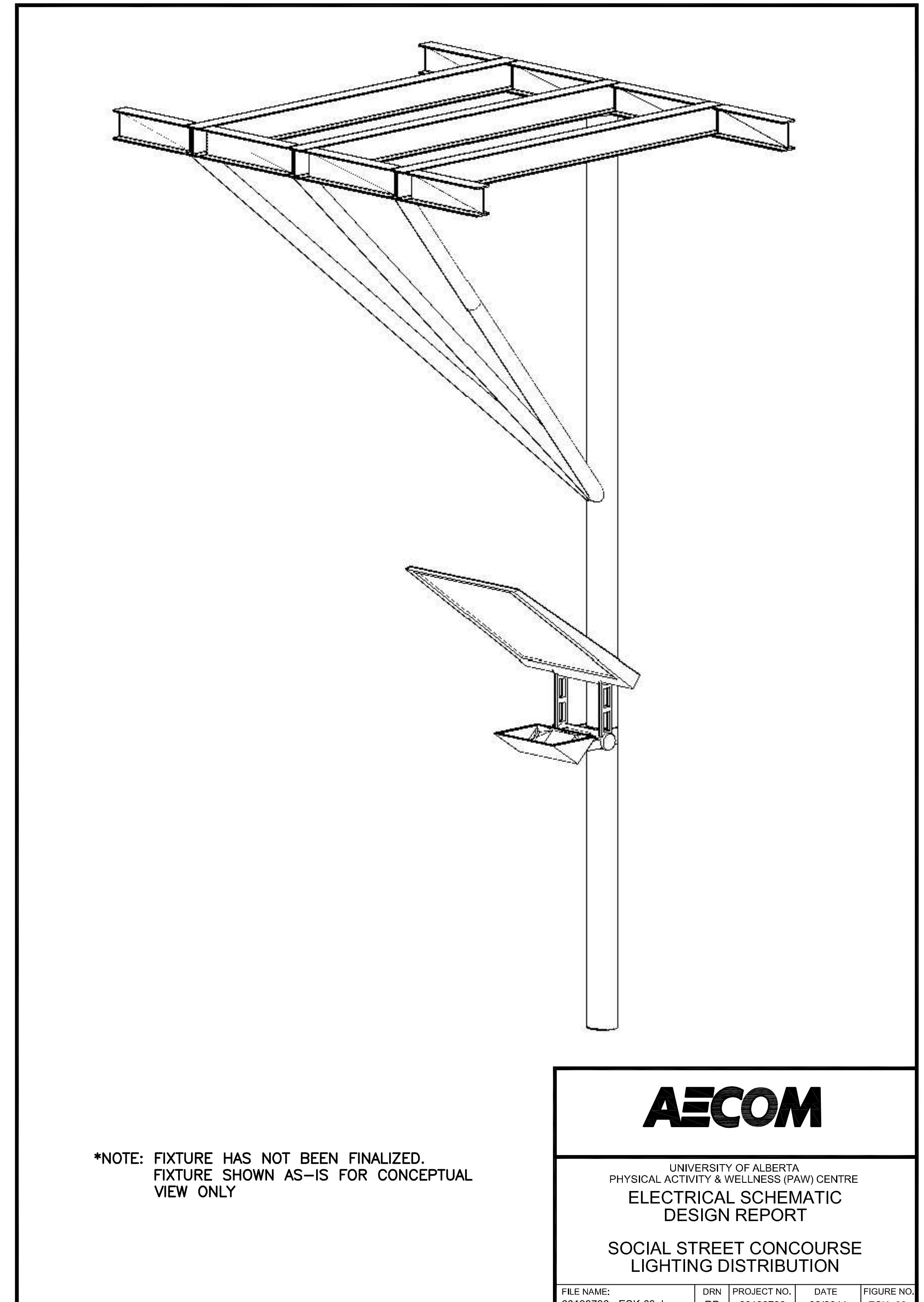
AECOM

UNIVERSITY OF ALBERTA
PHYSICAL ACTIVITY & WELLNESS (PAW) CENTRE
ELECTRICAL SCHEMATIC
DESIGN REPORT

PROPOSED BASEMENT
ELECTRICAL ROOMS

FILE NAME:	DRN	PROJECT NO.	DATE	FIGURE NO.
60193796 - ESK-01.dwg	RP	60193796	02/2011	ESK -01


NEW SECTIONALIZER #11: BLUE SIDE, 15kV
NEW SECTIONALIZER #11: WHITE SIDE, 15kV
NOTES:
1. EMERGENCY GENERATOR MAY BE INCORPORATED INTO ELECTRICAL DISTRIBUTION DESIGN ONCE EMERGENCY LOADS HAVE BEEN FINALIZED.
REFEED EXISTING S.S. 11 LOADS
REFEED EXISTING S.S. 11 LOADS
SUPPLIED AND INSTALLED BY UNIVERSITY
SUPPLIED BY UNIVERSITY, INSTALLED BY CONTRACTOR
SECTIONALIZER ROOM GROUND BAR (SUPPLIED BY CONTRACTOR)
15kV FUSED DISCONNECT
15kV FUSED DISCONNECT
#4/0 (TYPICAL)
SLAB STRUCTURAL REBAR
CABLE TRAY
ELECTRICAL ROOM GROUND BAR
PROPOSED 500kVA DRY TYPE CORE/COIL TRANSFORMER 13800/(600/347)V
NEW GROUND GRID (SUPPLIED BY CONTRACTOR)
1200AF 600AT 3P
MAIN BREAKER LSIG-SOLID STATE
CT'S
METER
SUPPLIED BY UNIVERSITY, INSTALLED BY CONTRACTOR
600/347V, 1200A, 3PH, 4W, 42kA SYM.
NEW PROPOSED SUBSTATION / CDP -1 SUBSTATION ROOM
SUPPLIED AND INSTALLED BY CONTRACTOR
xxA 3P
SPARES
LSIG
TVSS
VOLTAGE SUPPRESSOR
ELECTRICAL ROOM MAIN GROUND BAR
WATER PIPES
GAS PIPES
SLAB STRUCTURAL REBAR
LAN. BACKBOARD/ RACK
TEL. BACKBOARD/ RACK
CABLE TRAY
SECTIONALIZER ROOM GROUND BAR
TX-2A 600/208V TRANSFORMER
TX-2B 600/208V TRANSFORMER
TX-2C 600/208V TRANSFORMER
MAIN ELECTRICAL ROOM
MCC-1 600V, 3PH, 3W
PENTHOUSE ELECTRICAL ROOM
MCC-2 600V, 3PH, 3W
PANEL '6A'
PANEL '6B'
PANEL '2A'
PANEL '2B'
PANEL '2C'
ACTIVE FILTER 'A'
ACTIVE FILTER 'B'
MAIN ELECTRICAL ROOM
PENTHOUSE ELECTRICAL ROOM
600V HVAC LOADS
600V MISC LOADS
SPARES
HARMONIC MITIGATOR / POWER FACTOR CORRECTOR
AECOM
UNIVERSITY OF ALBERTA
PHYSICAL ACTIVITY & WELLNESS (PAW) CENTRE
ELECTRICAL SCHEMATIC DESIGN REPORT
PROPOSED POWER DISTRIBUTION SINGLE LINE DIAGRAM
FILE NAME: 60193796 - ESK-02.dwg
DRN RP
PROJECT NO. 60193796
DATE 02/2011
FIGURE NO. ESK -02


*NOTE: FIXTURE HAS NOT BEEN FINALIZED. FIXTURE SHOWN AS-IS FOR CONCEPTUAL VIEW ONLY
AECOM
UNIVERSITY OF ALBERTA
PHYSICAL ACTIVITY & WELLNESS (PAW) CENTRE
ELECTRICAL SCHEMATIC DESIGN REPORT
SOCIAL STREET CONCOURSE LIGHTING DISTRIBUTION
FILE NAME: 60193796 - ESK-03.dwg
DRN RP
PROJECT NO. 60193796
DATE 02/2011
FIGURE NO. ESK -03

AMETRIX™

DESCRIPTION

- Extruded aluminum housing
- Die-cast aluminum end caps
- Integrated visor option
- Die-formed 94% reflective dual-finish anodized aluminum reflector
- Electrostatically applied polyester powder coat paint finish
- Gasketed hinging doorframe
- PointGrabTM adjustment
- Adjustable, external reflector locks in three positions

Catalog #		Type
Project		
Comments		Date
Prepared by		

SPECIFICATION FEATURES

Construction
Housing is 6063 aluminum extrusion with die-cast aluminum end caps with concealed fasteners. Hinging doorframe for easy access to gasketed lamp compartment, and stainless steel hardware. Optional integrated extruded aluminum cutoff visor.

Internal Reflector
Die-formed 94% reflective dual-finish anodized aluminum.

External Reflector
AER1: White painted aluminum.
AER2: Specular aluminum.
Three lockable adjustment points: Full up, intermediate, full down.

Aiming
PointGrab adjustable and lockable aiming system is preset at the factory (25 degrees max. cp. above horizontal). Additional 10-degree indicator marks allow for precise adjustments.

Lens
Clear tempered glass.

Electrical
Use 90-degree supply wire. Metal Halide - T6 G12. Do not use with 4K (942 Series) or Osram Powerball Lamps.

Mounting
Standard canopy mounts over recessed junction box (by others). Support structure by others.

Finish
Luminaire housing is finished using electrostatically applied polyester powder coat paint. Luminaires with white external reflector have matching white paint finish. Luminaires with specular external reflector have silver paint finish.

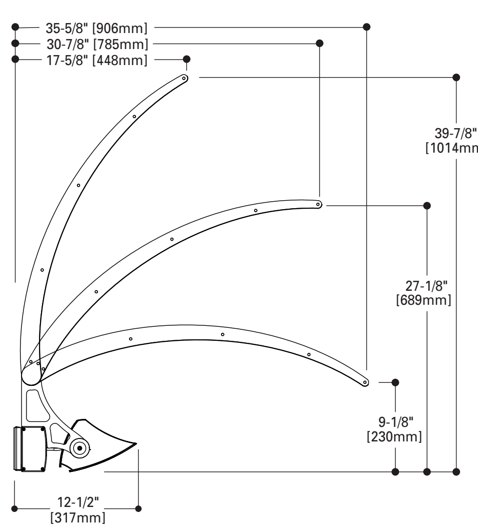
Labels
UL and CUL listed for damp locations.

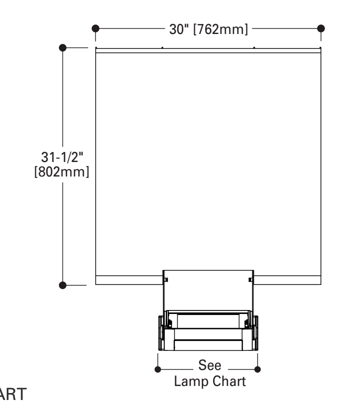
VAULT AER1
White Fixture/
White AER

VAULT AER2
Silver Fixture/
MIRO Finish AER

Small Integral with Adjustable External Reflector

WALL





LAMP CHART

LAMP SOURCE	(NO. OF LAMPS) / WATTAGE	ENVELOPE	BASE	HOUSING LENGTH
Electronic Metal Halide	(1) 39	T6	G12	10-3/4"
	* (1) 39 w/ quartz restrike	T6	G12	13"
	*(1) 70 / 150	T6	G12	13"

* Optional 75W / T4 / Mini Can quartz restrike (QRS) available with this source for 120V only

ORDERING INFORMATION

Sample Number: VN-SI-C-1-E-150-120-AER1-YI01

Product
VN = Vault No Visor
VS = Vault Solid Visor
VO = Vault Opal Visor

Size - In/Outdoor
SI = Small Indoor

Lens
C = Clear

Number of Lamps
= 1 Lamp

Lamp Type
E = Metal Halide - Electronic

Wattage
039 = 39W
070 = 70W
150 = 150W

Voltage
120 = 120V
277 = 277V
347 = 347V

Luminaire / External Reflector Finish
AER1 = White / White
AER2 = Silver / Specular

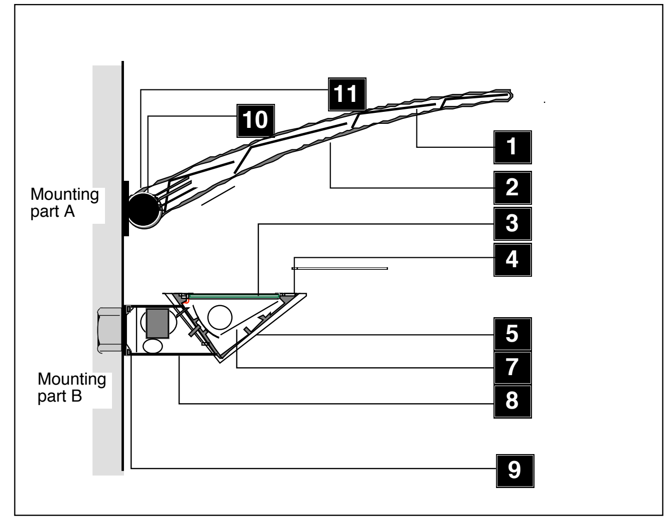
Mounting
YI01 = Yoke Integral Style 01

Options
QRS = Quartz Restrike [1]

Notes: 1 Not available for 277V or 347V.

LUMINIS **Wall mount** PELICAN

Specification **PL20W**

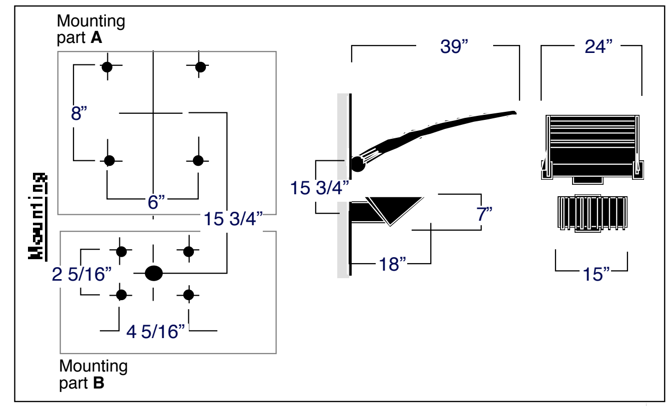


All exposed cast aluminum components are made of non corrosive pure aluminum copper free (Aluminum is less than .1% copper content.#356 alloy.)

Finish: All polyester powder baked coatings preceded with a 5 baths preparation process. Meets military grade MIL-C781706 with a 2000 hours salt spray test.

- Multi faceted twin reflector assembly can tilt and slide along pole side, to maximize desired performance on field. A locking cast aluminum assembly is provided to secure adjusted position of reflectors. Multi faceted reflector panels are painted with a textured white coating applied on both faces. The white enamel textured finish over the reflective surface insures optimal lighting performance and brightness control.

- Pulse rated porcelain socket.
- One-piece molded silicone gasket with memory retention.
- High power factor CWA ballast, installed on a tray with a quick disconnect assembly.
- All stainless steel hardware.
- All Moving and removable parts are sealed with a memory retention silicone gasket.

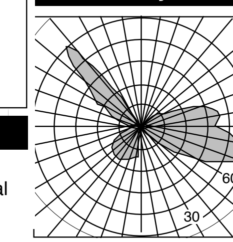


1 - Multi facet textured white aluminum reflector panels assembly.
2 - Cast aluminum curved reflector joiner arms.
3 - Tempered clear glass lens.
4 - Cast aluminum sealed removable glass frame, with perimeter memory retention embedded silicone gasket.
5 - Cat aluminum luminaire housing with heat dissipation fins.
6 - Specular aluminum reflector.
8 - Isolated and sealed aluminum ballast housing.
9 - 11 ga. galvanized pressure mounting plate.
10 - Aluminum reflector cross arm assembly.
11 - Cast aluminum tilting and locking assembly.

Certification
UL. Wet Location.

Mounting
Max. weight: 30 lbs reflector assembly: 10 lbs
Installation: Connects to a standard 4" electrical box with 3 1/2" c/c mounting holes.
(by others) additional separate mounting holes are provided with wall plate

Photometry



Separate updated technical specification sheets with related models and light sources with I.E.S formatted photometry are available on **www.luminis.com.**

Please refer to pages **72 &79** for additional details.

Model#
☐ PL20W

Light source selection

MH (ED17)
☐ M70
☐ M100
☐ M150
☐ M175
☐ * M250 (T15) Mog. base

HPS (ED17)
☐ H70
☐ H100
☐ H150
☐ * H250 (ED18) Mog. base

(Lamps by others)

Voltage
120 V Standard factory prewired
(If no voltage is specified)
For other voltages, please specify with catalog number.

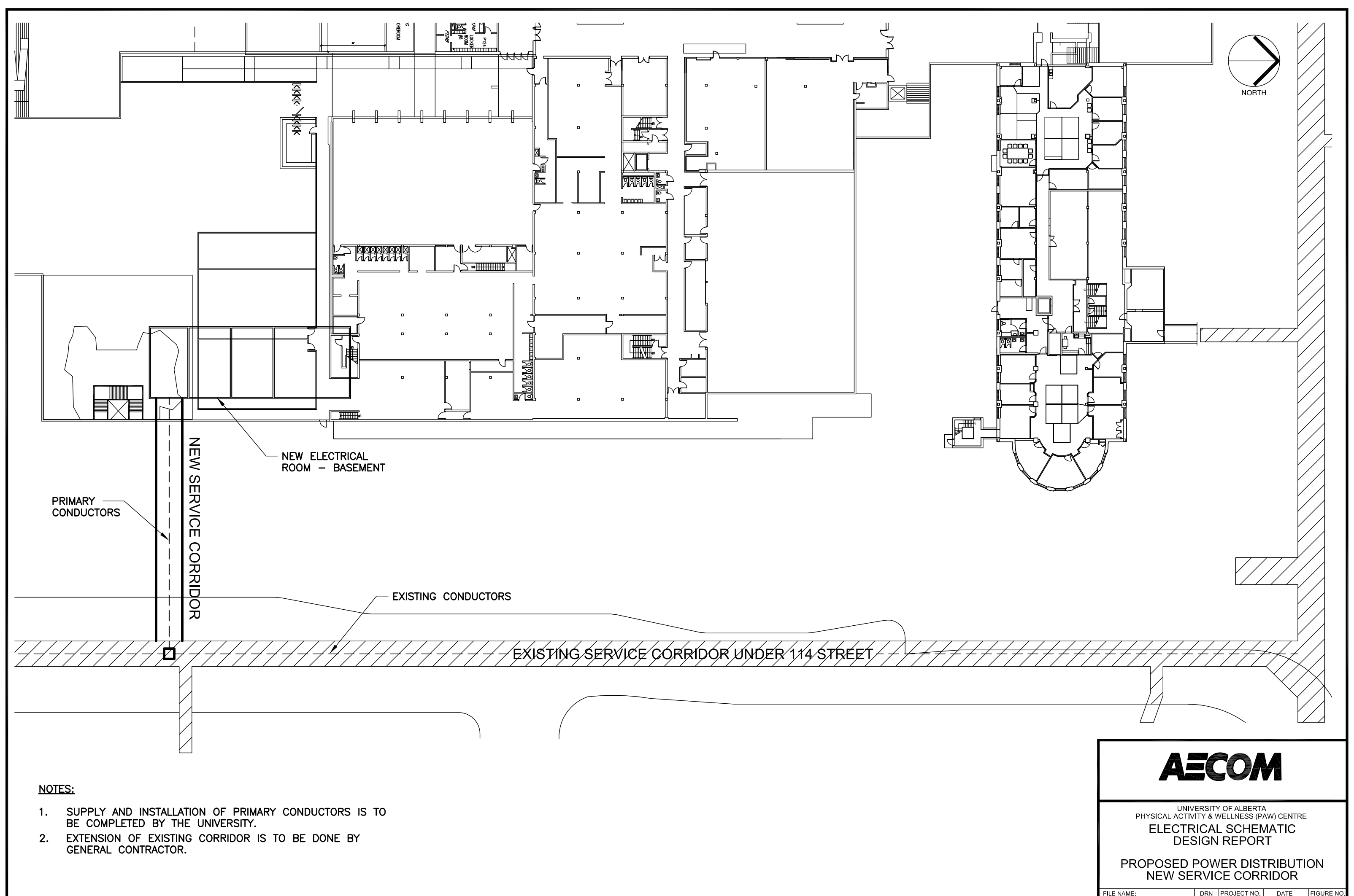
H.I.D.
☐ 208 V
☐ 240 V
☐ 277 V
☐ 347 V
☐ 480 V

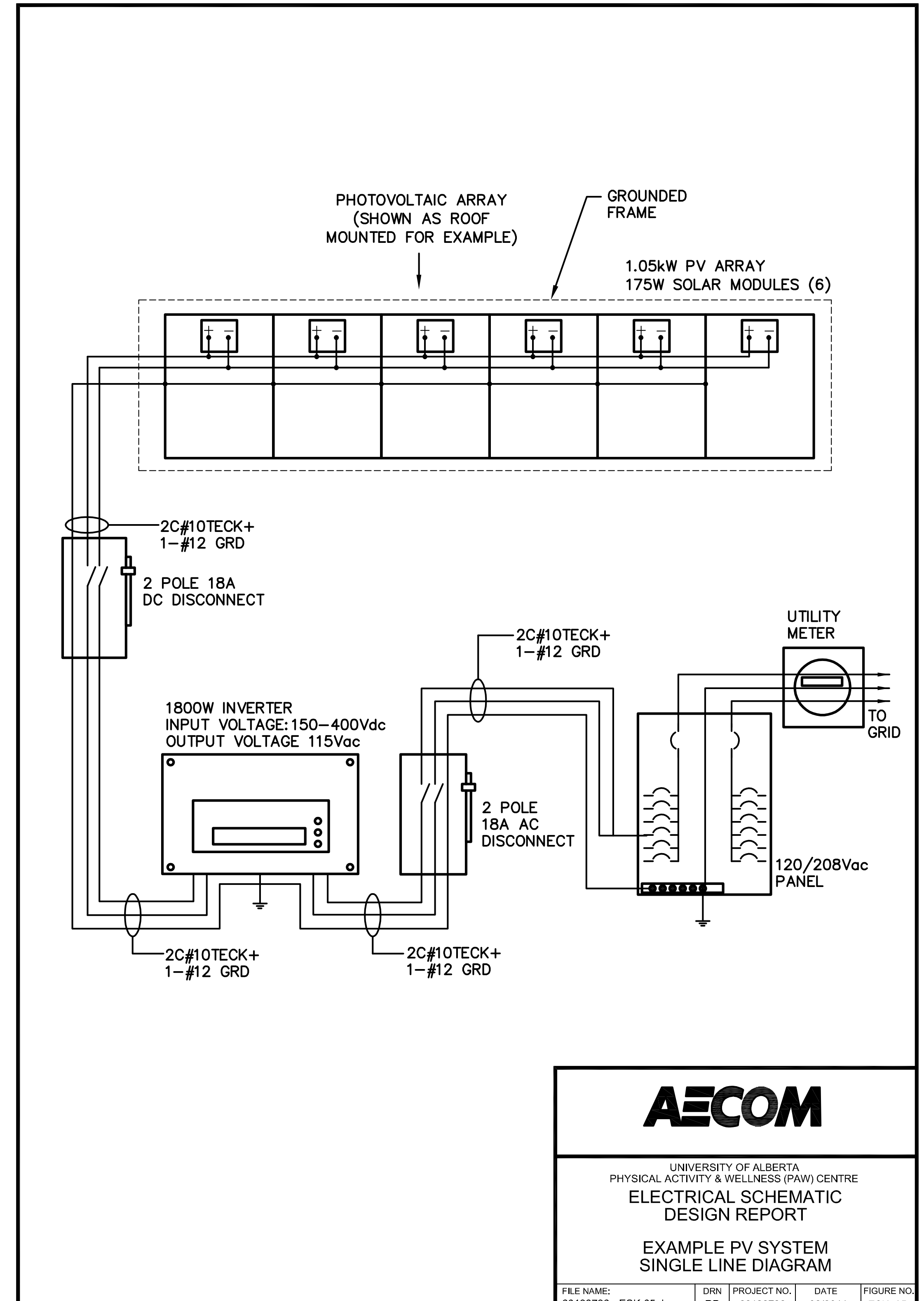
* Lamp operation requires
M250 ANSI code M58
H250 ANSI code S50

Finish
(Refer to color chart)
Standard selection
☐ **WHT**:Snow white
☐ **BKT**: Jet black
☐ **BZT**: Bronze
☐ **GRT**: Titanium gray
☐ **DGT**: Gun metal
☐ **CHT**: Champagne
☐ **MST**: Matte silver
☐ **GNT**: Forest green
Optional colors
☐ **CS**: Custom color
☐ **RAL**: RAL# color

Options
Electrical
☐ **FS:** Fuse
☐ **PH1**: 120/277V photo cell
☐ **PH2**: 347V photo cell
☐ **QS:** Quartz lamp socket for external emergency power.
☐ **QRS:** Quartz restrike standby relay.

Luminaires may be altered for improvements or discontinued without prior notice.


NORTH
NEW ELECTRICAL ROOM – BASEMENT
PRIMARY CONDUCTORS
NEW SERVICE CORRIDOR
EXISTING CONDUCTORS
EXISTING SERVICE CORRIDOR UNDER 114 STREET
NOTES:
1. SUPPLY AND INSTALLATION OF PRIMARY CONDUCTORS IS TO BE COMPLETED BY THE UNIVERSITY.
2. EXTENSION OF EXISTING CORRIDOR IS TO BE DONE BY GENERAL CONTRACTOR.
AECOM
UNIVERSITY OF ALBERTA
PHYSICAL ACTIVITY & WELLNESS (PAW) CENTRE
ELECTRICAL SCHEMATIC
DESIGN REPORT
PROPOSED POWER DISTRIBUTION
NEW SERVICE CORRIDOR
FILE NAME: 60193796 - ESK-04.dwg
DRN RP
PROJECT NO. 60193796
DATE 02/2011
FIGURE NO. ESK -04

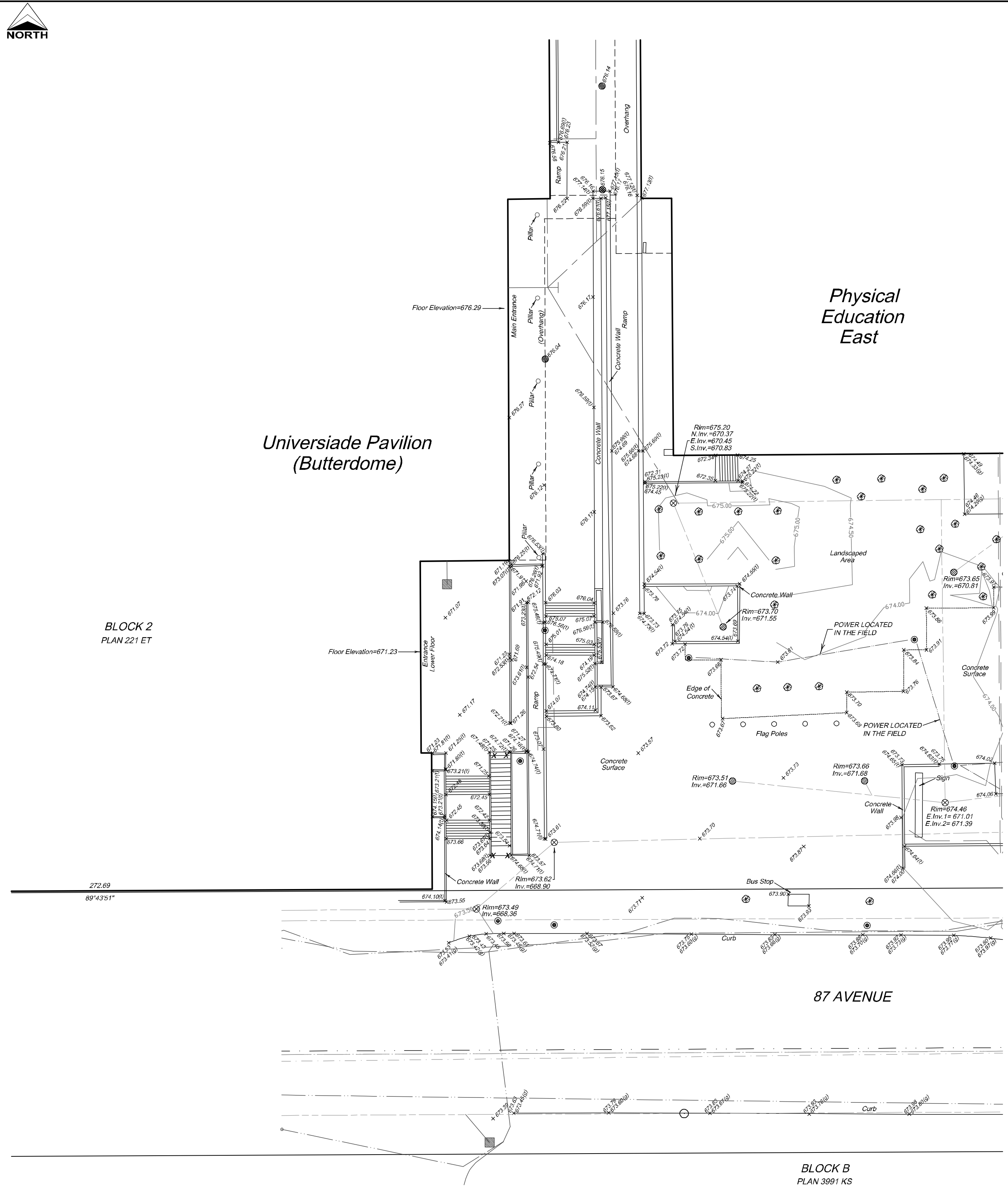

PHOTOVOLTAIC ARRAY
(SHOWN AS ROOF
MOUNTED FOR EXAMPLE)
GROUNDED
FRAME
1.05kW PV ARRAY
175W SOLAR MODULES (6)
2C#10TECK+
1–#12 GRD
2 POLE 18A
DC DISCONNECT
1800W INVERTER
INPUT VOLTAGE:150–400Vdc
OUTPUT VOLTAGE 115Vac
2C#10TECK+
1–#12 GRD
2 POLE
18A AC
DISCONNECT
UTILITY
METER
TO
GRID
120/208Vac
PANEL
2C#10TECK+
1–#12 GRD
2C#10TECK+
1–#12 GRD
AECOM
UNIVERSITY OF ALBERTA
PHYSICAL ACTIVITY & WELLNESS (PAW) CENTRE
ELECTRICAL SCHEMATIC
DESIGN REPORT
EXAMPLE PV SYSTEM
SINGLE LINE DIAGRAM
FILE NAME: 60193796 - ESK-05.dwg
DRN RP
PROJECT NO. 60193796
DATE 02/2011
FIGURE NO. ESK -05

9.0 ESTIMATE OF PROBABLE COST

A preliminary construction budget estimate has been prepared by an independent cost consultant (Cuthbert Smith) on behalf of the consultant team. The construction budget based on the current schematic design content is estimated to cost $59.6 million ($46.8 million for Hard Costs, $11.9 million for Soft Costs, and 1.65% net GST). This estimate includes 5% design contingency and 10% construction contingency.

There is currently a funding shortfall that senior level administration is actively addressing. Market conditions are currently favorable for competitive trade pricing and the design team will continue to identify potential cost savings through the detailed design phase of the project.

Site Survey



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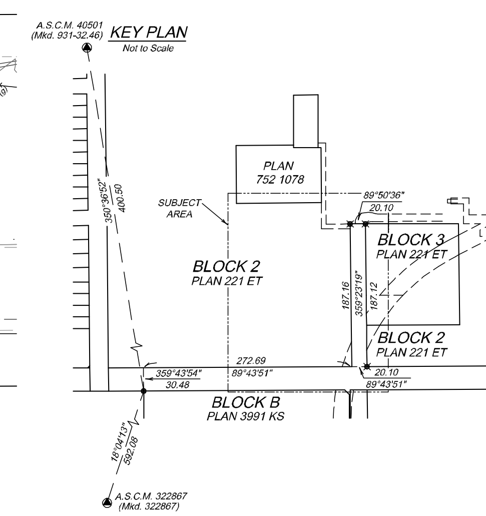
I, HUONG NGUYEN, Alberta Land Surveyor, hereby certify this plan correct as of December 9, 2010.

SIGNED IN EDMONTON

this 21st day of December, 2010.

HUONG NGUYEN, A.L.S.
(copyright reserved)

KEY PLAN



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SCALE: 1:250

LEGEND

STATUTORY IRON SURVEY POST
MANHOLES
CATCHBASINS
FIRE HYDRANTS
PEDESTALS
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FENCE
LIGHT STANDARDS
DRAIN
CONTOURS 675.00

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Faculty/Department **FACULTY OR DEPARTMENT**

Client Approval Date -

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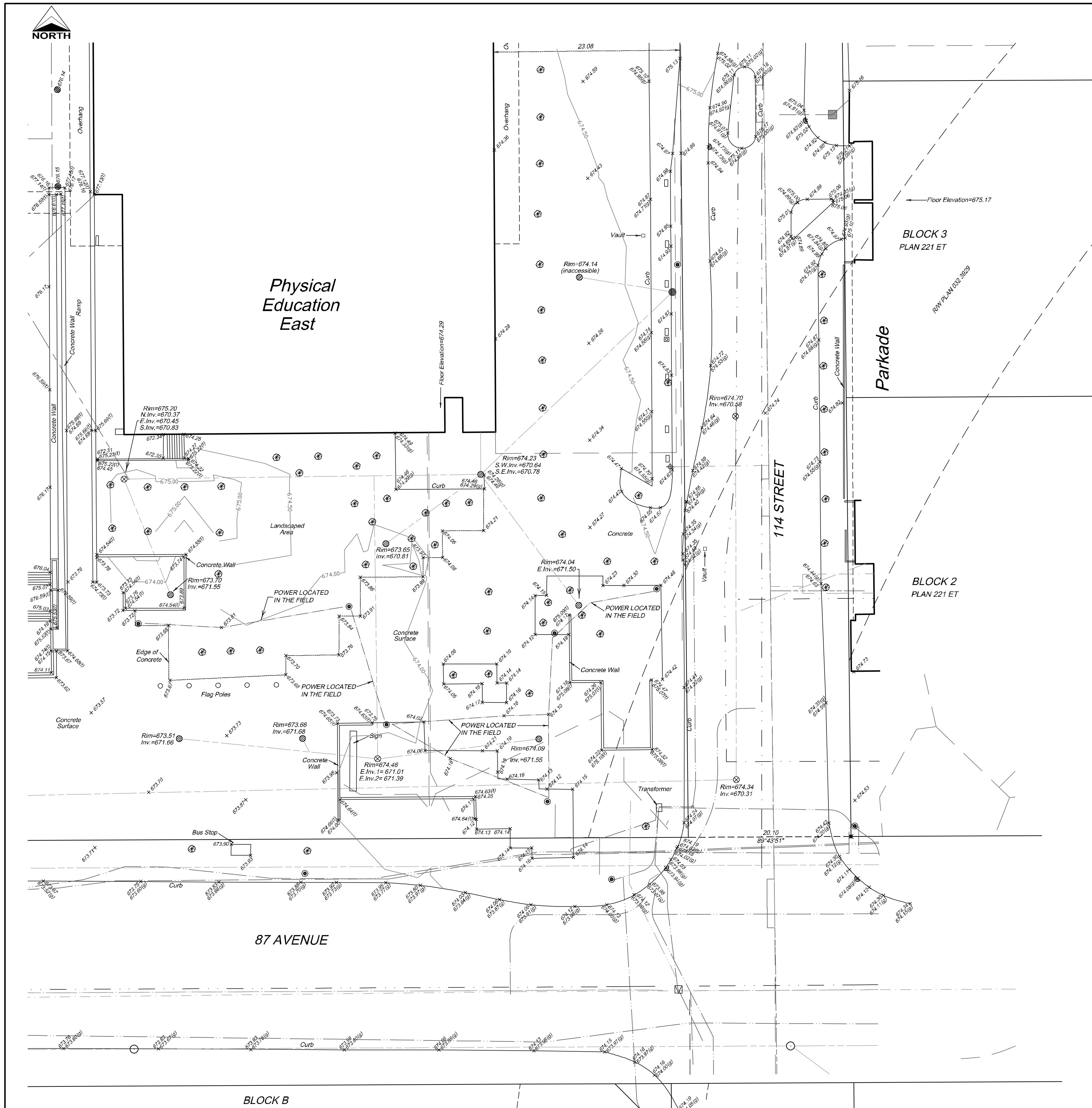
U. OF A.
EDMONTON ALBERTA

Building

Job Number **010029732**		Work Order Number -	
Arch ■ Mech ■ Elect ■		Drawn By **CS**	
Plot Date **2010/12/15**		Issue **A**	Revision **0**
Sheet **1 OF 4**		University Dwg Num -	

010029732-BLAB01-R00



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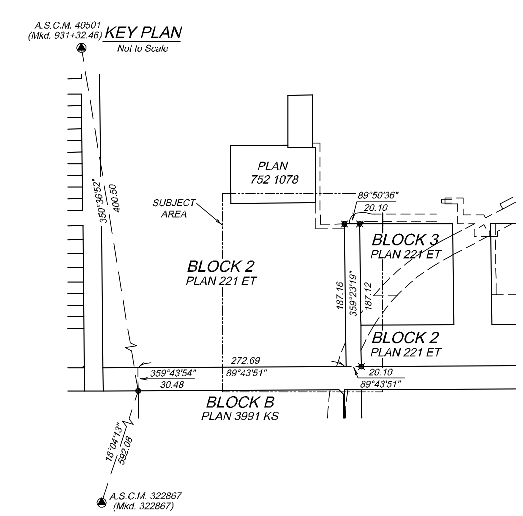

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LEGEND

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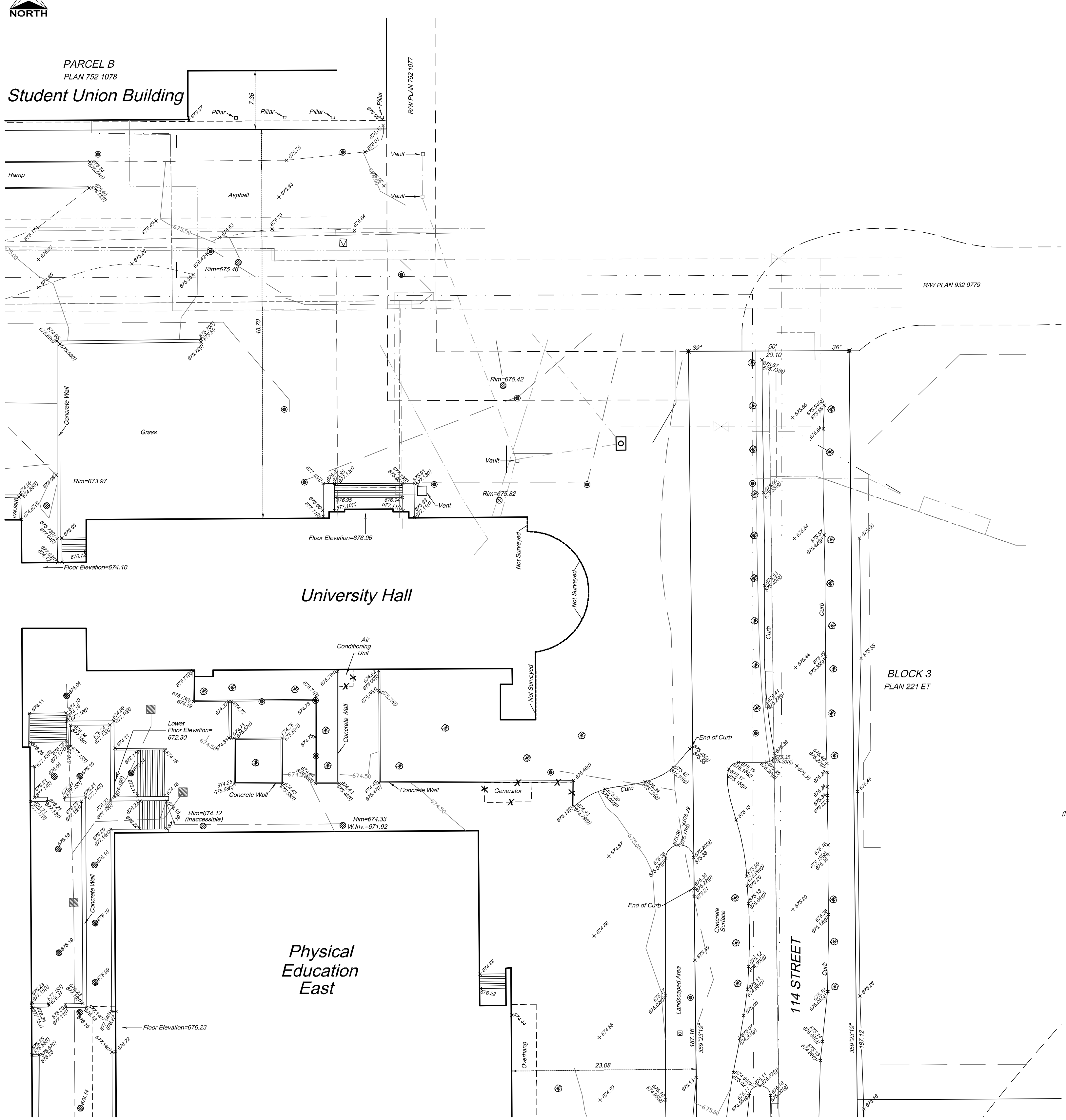
Group2 architecture engineering



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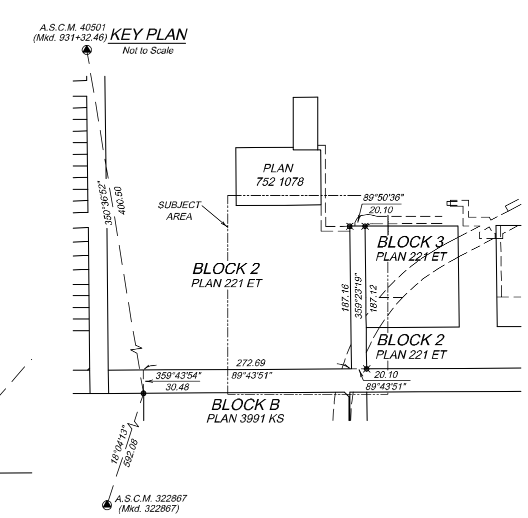

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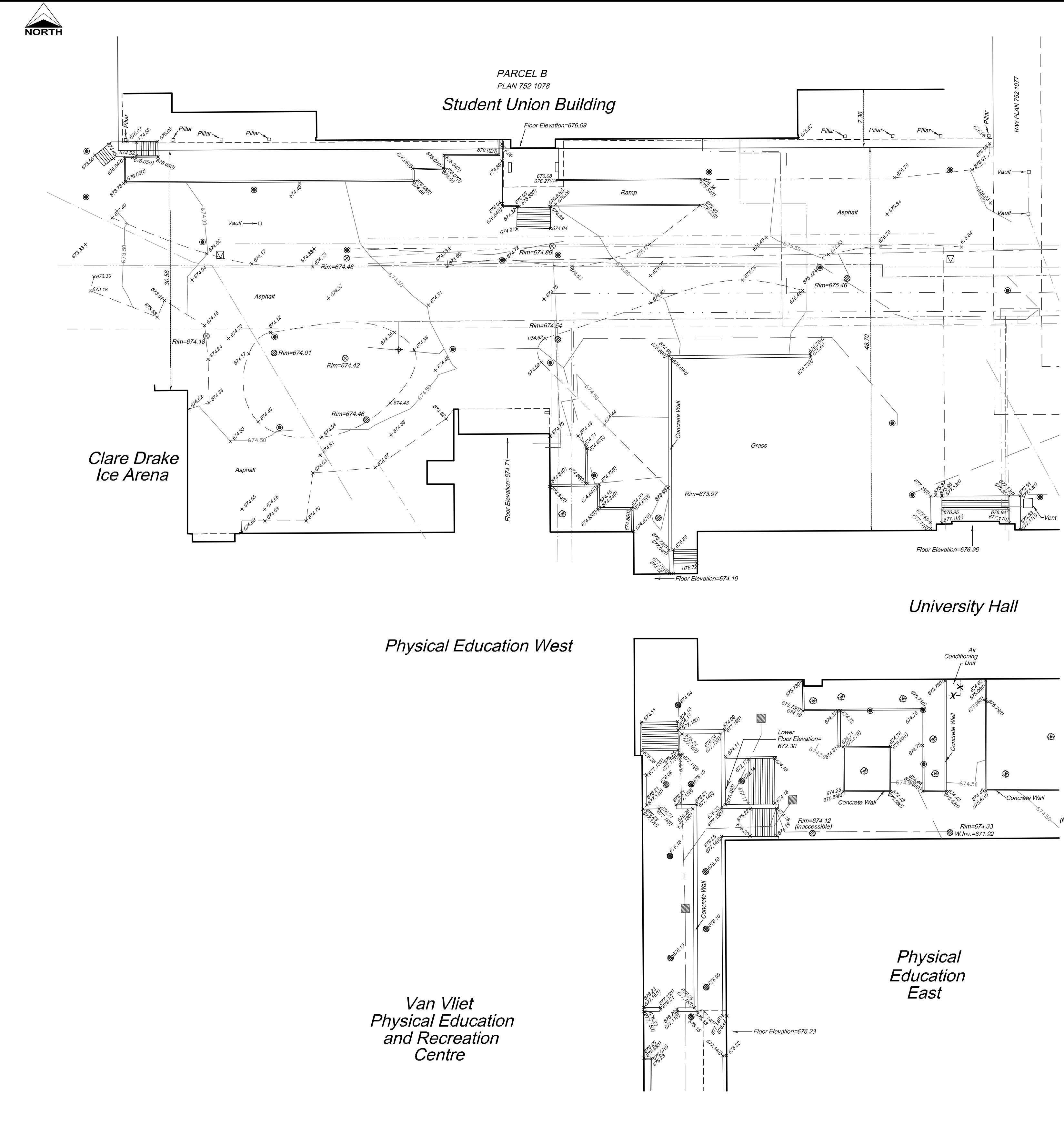

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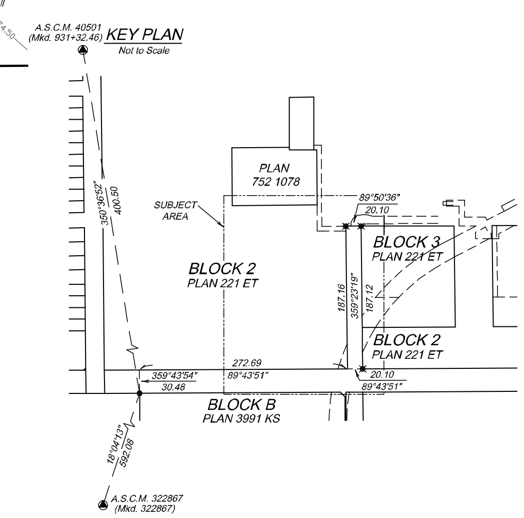

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Sheet	**4 OF 4**	University Dwg Num	-

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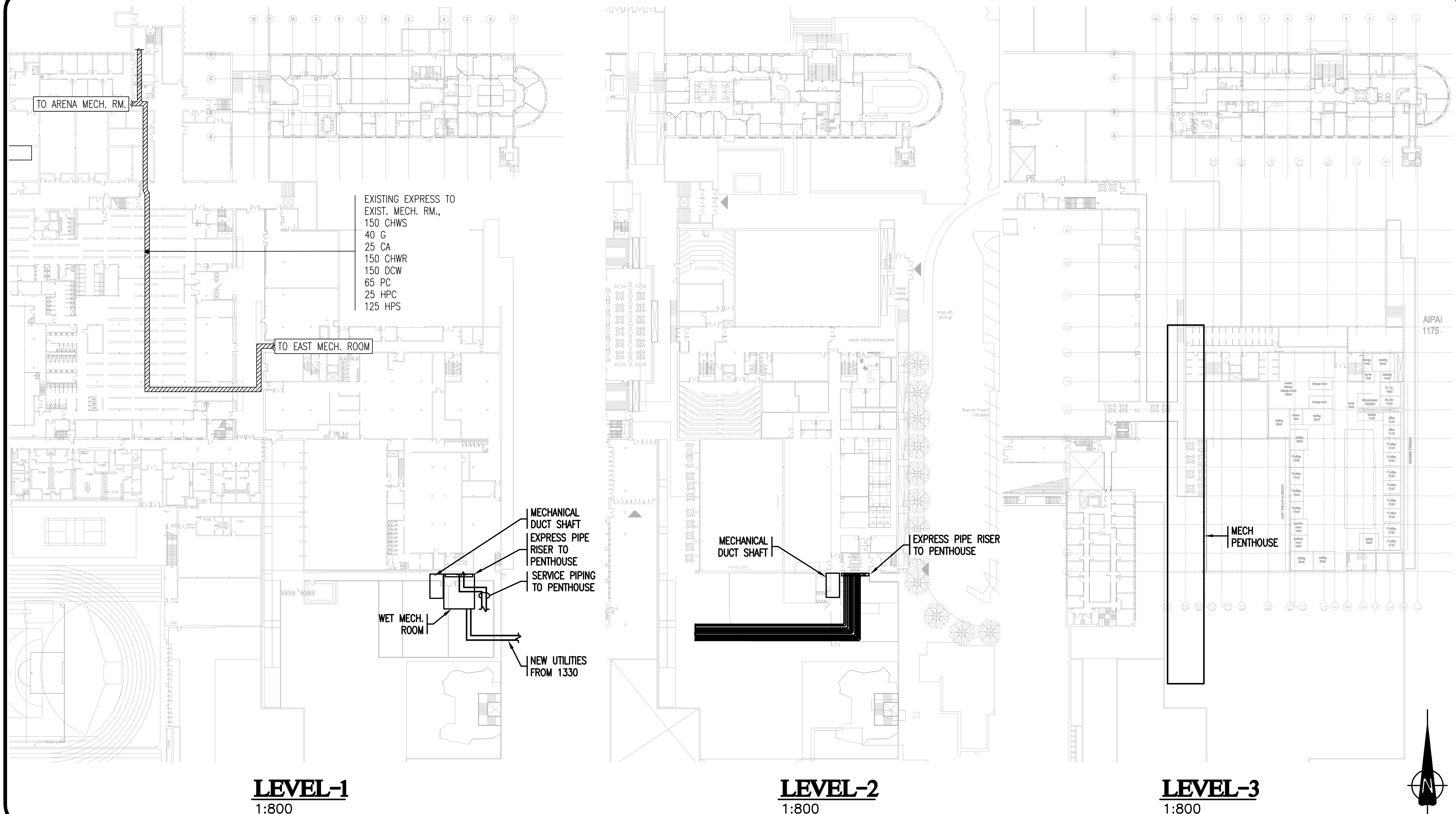
Group2 architecture engineering

Additional Mechanical Information

Mechanical Drawings
Preliminary Mechanical Equipment List



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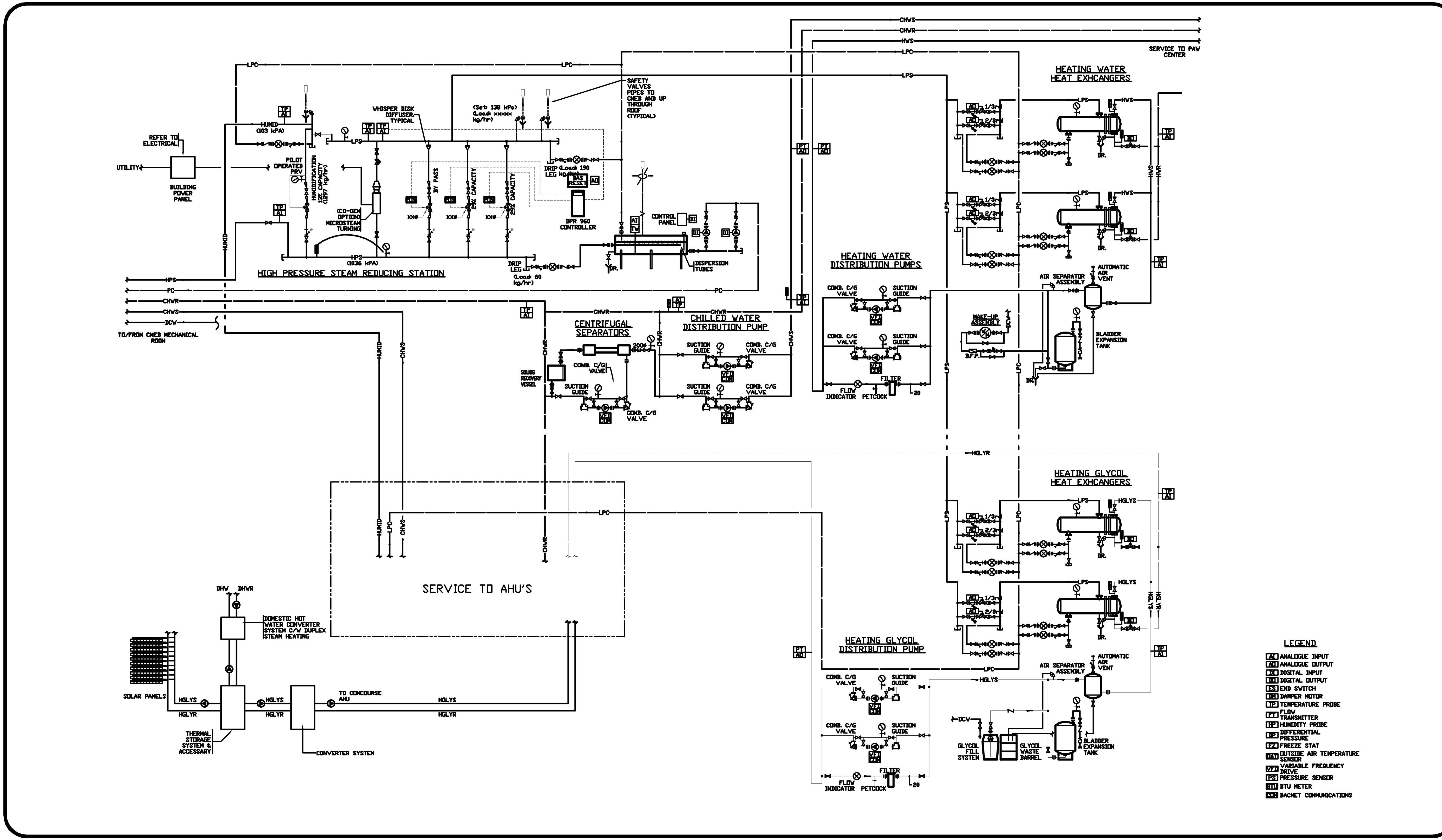
* EDMONTON * CALGARY * ATLANTA *

DRAWING:	MECHANICAL UTILITIES SERVICING OPTION–U1			**PROJECT:**	UNIVERSITY OF ALBERTA PAW CENTRE
DATE:	2011-02-28	**JOB No:**	E10211	**SCALE:**	1:800
				DWG. No.:	MSK-01



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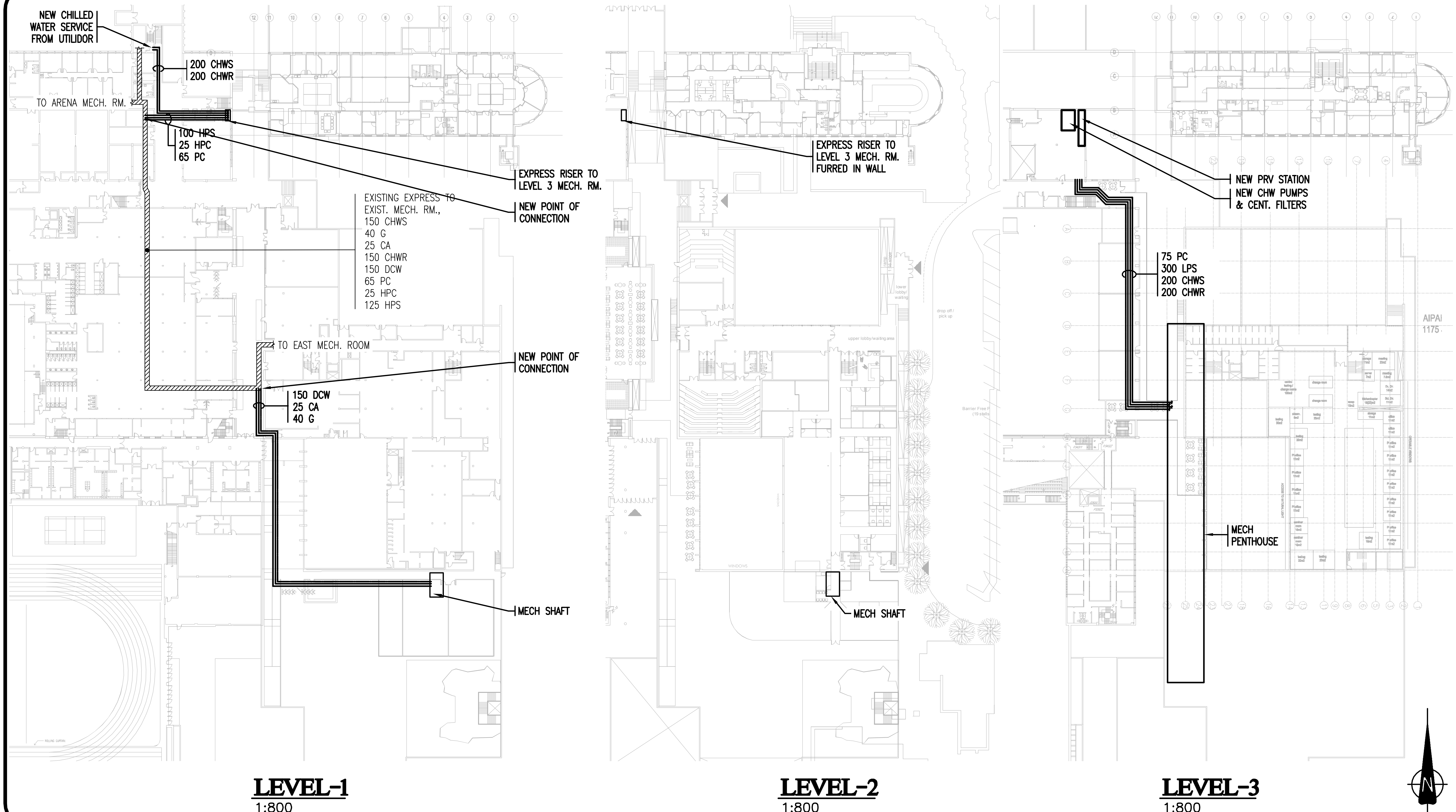
DRAWING:	MECHANICAL SCHEMATICS (HEATING & COOLING SCHEMATIC)	**PROJECT:**	UNIVERSITY OF ALBERTA PAW CENTRE
DATE:	2011-02-28	**JOB No:**	E10211
SCALE:	N.T.S	**DWG. No.:**	MSK-10



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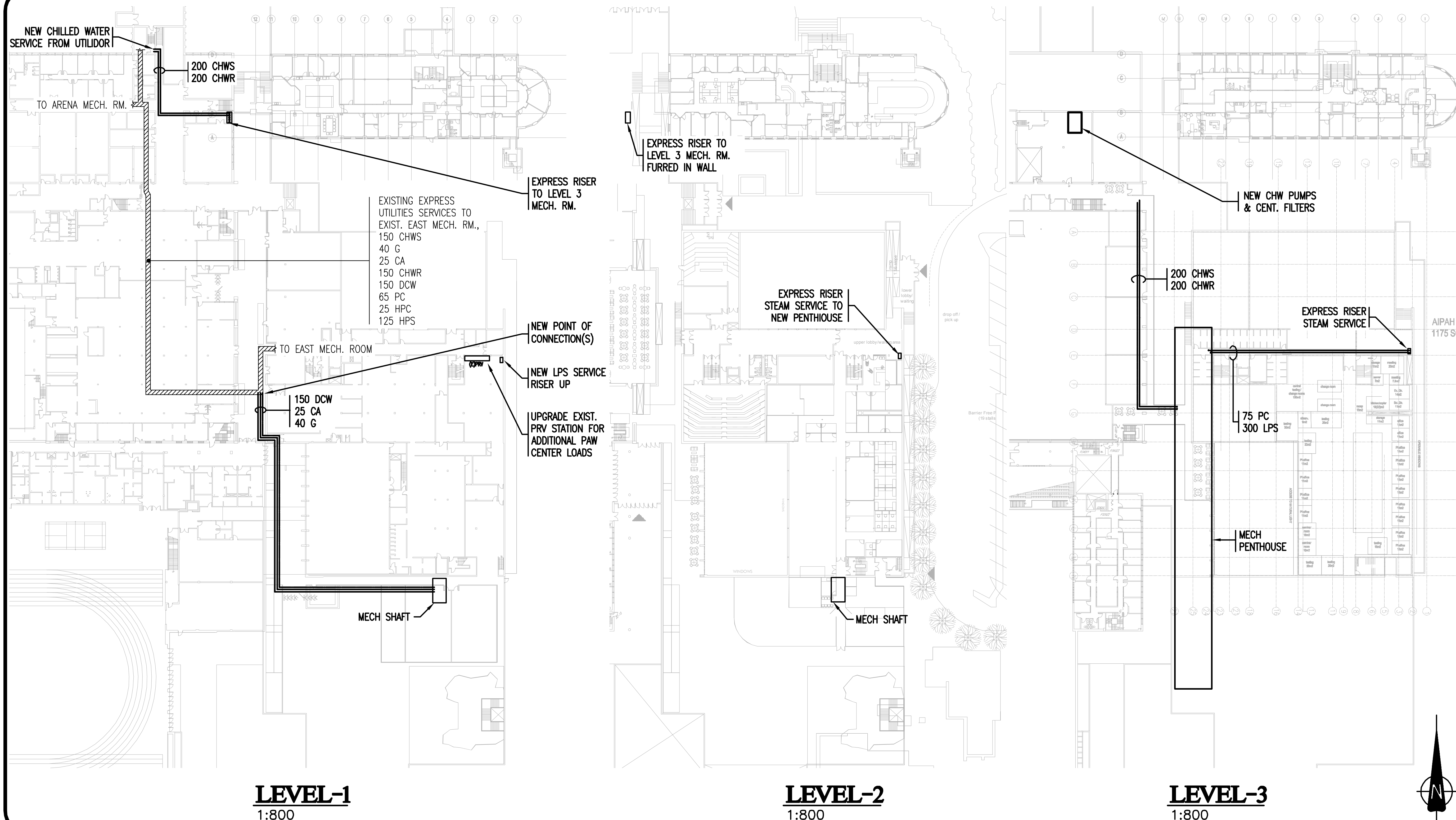
DRAWING: MECHANICAL UTILITIES SERVICING OPTION-U2
PROJECT: UNIVERSITY OF ALBERTA PAW CENTRE
DATE: 2011-02-28
JOB No: E10211
SCALE: 1:800
DWG. No.: MSK-02



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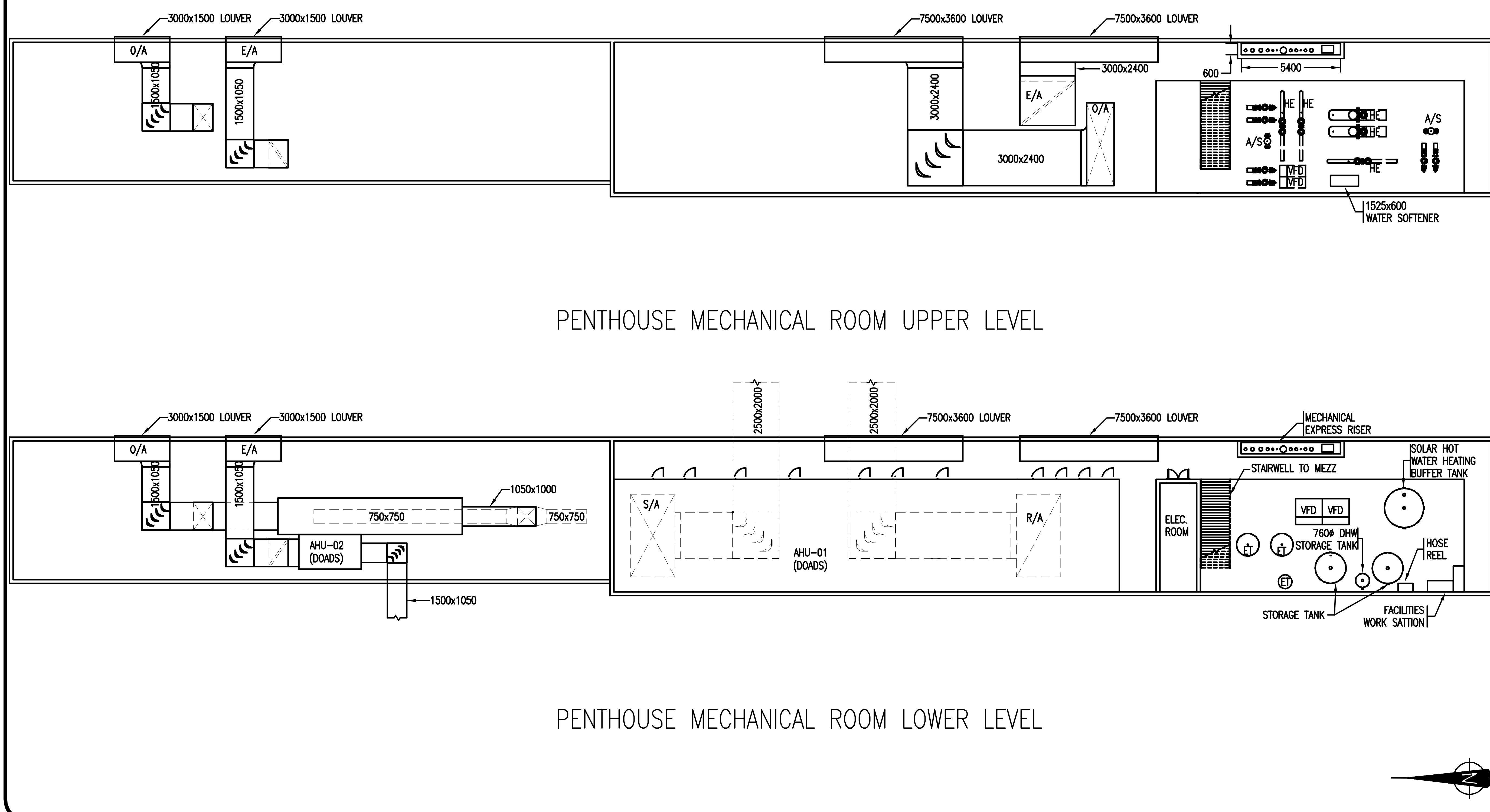
DRAWING: MECHANICAL UTILITIES SERVICING OPTION–U3		**PROJECT:** UNIVERSITY OF ALBERTA PAW CENTRE	
DATE: 2011–02–28	**JOB No:** E10211	**SCALE:** 1:800	**DWG. No.:** MSK–03

Group2 architecture engineering



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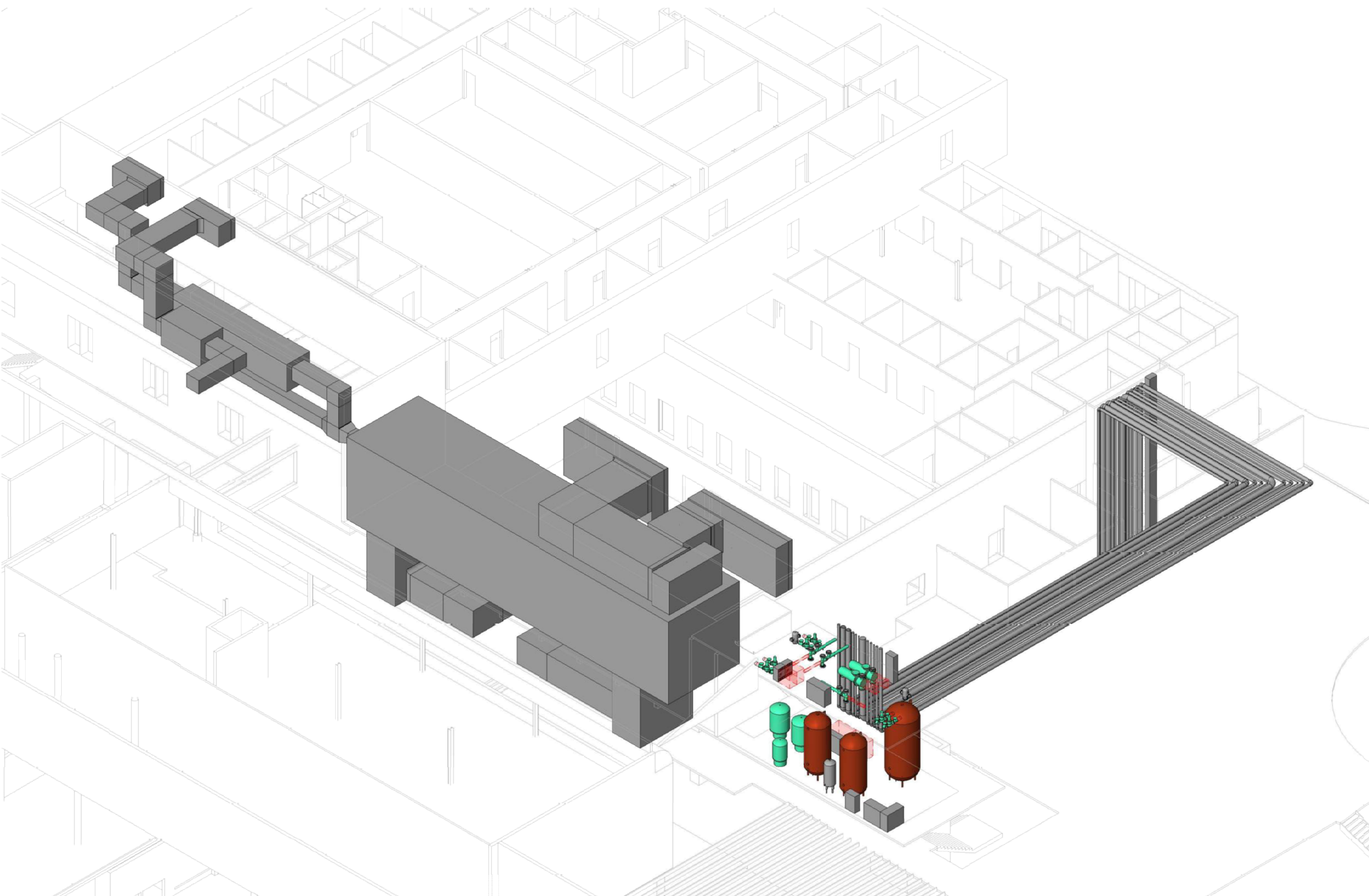
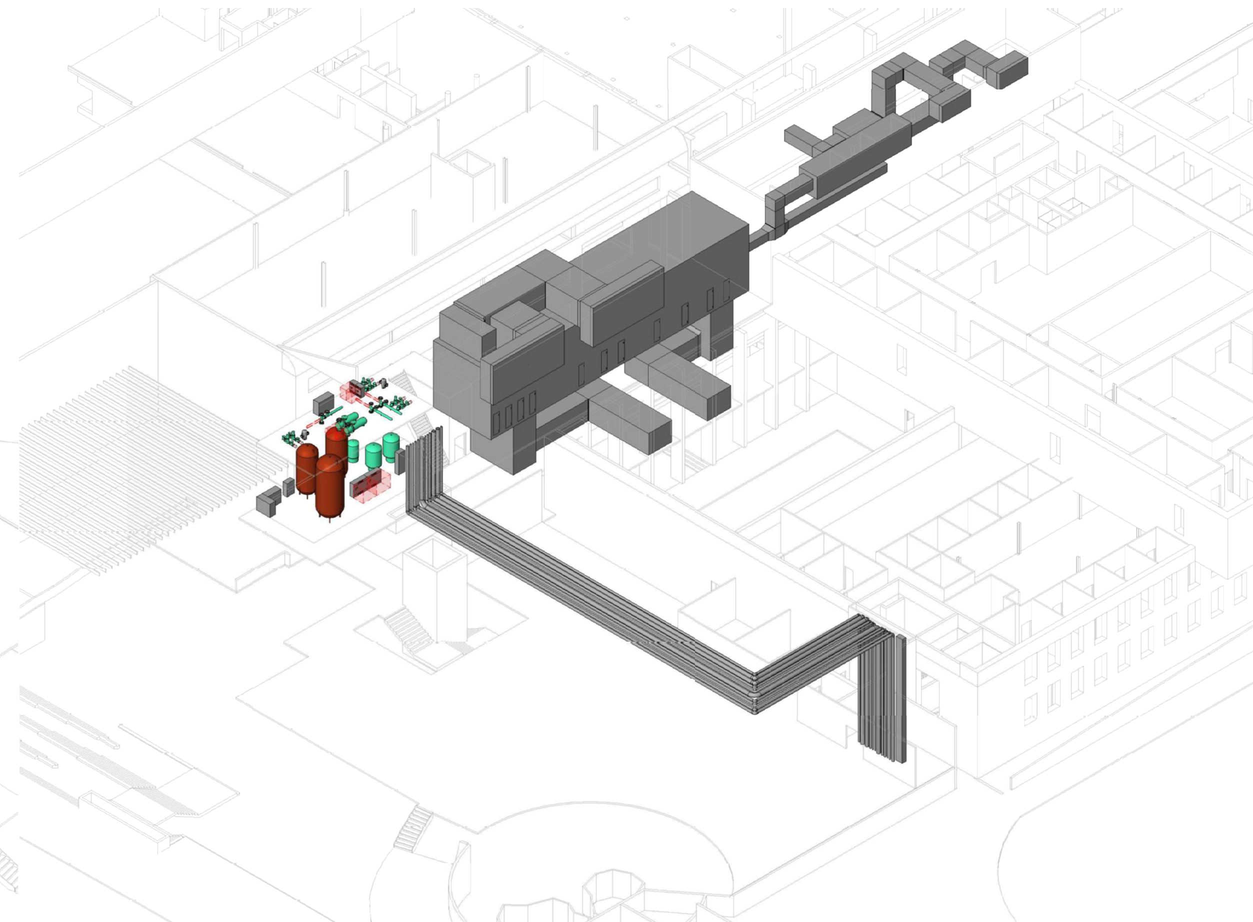
DRAWING: PENTHOUSE MECHANICAL ROOM OPTION #1 **PROJECT:** UNIVERSITY OF ALBERTA PAW CENTRE

DATE: 2011-02-28 **JOB No:** E10211 **SCALE:** 1:200 **DWG. No.:** MSK-04

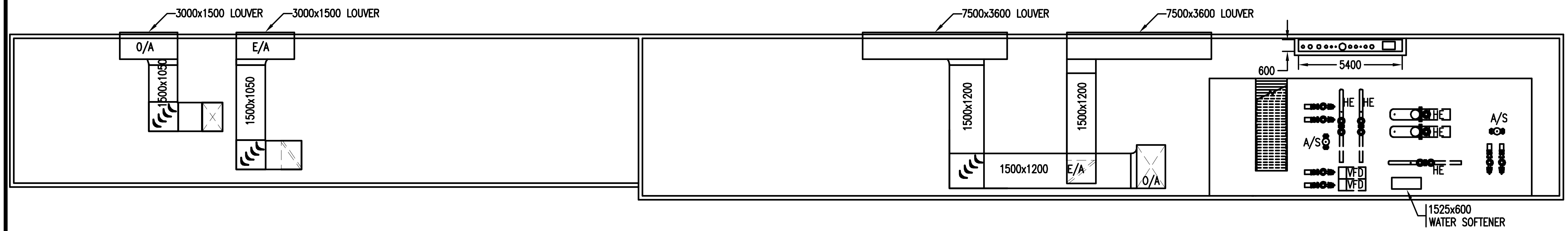




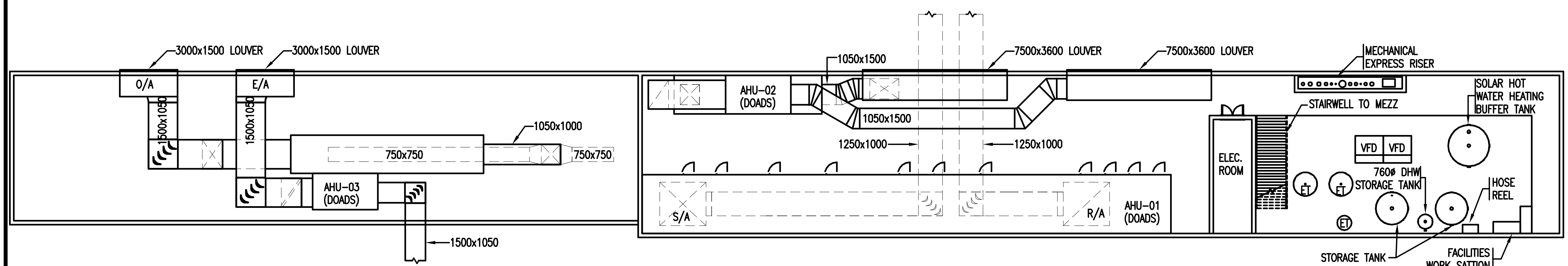
PENTHOUSE MECHANICAL ROOM 3D RENDERING

HEMISPHERE ENGINEERING INC.
CONSULTING ENGINEERS
* EDMONTON * CALGARY * ATLANTA *

DRAWING:	PENTHOUSE MECHANICAL ROOM 3D RENDERING OPTION #1	**PROJECT:**	UNIVERSITY OF ALBERTA PAW CENTRE
DATE:	2011-02-28	**JOB No:**	E10211
SCALE:	N.T.S	**DWG. No.:**	MSK-05



PENTHOUSE MECHANICAL ROOM UPPER LEVEL



PENTHOUSE MECHANICAL ROOM LOWER LEVEL

ENGINEERING INC.
HEMISPHERE
CONSULTING ENGINEERS
* EDMONTON * CALGARY * ATLANTA *

DRAWING: PENTHOUSE MECHANICAL ROOM OPTION #2
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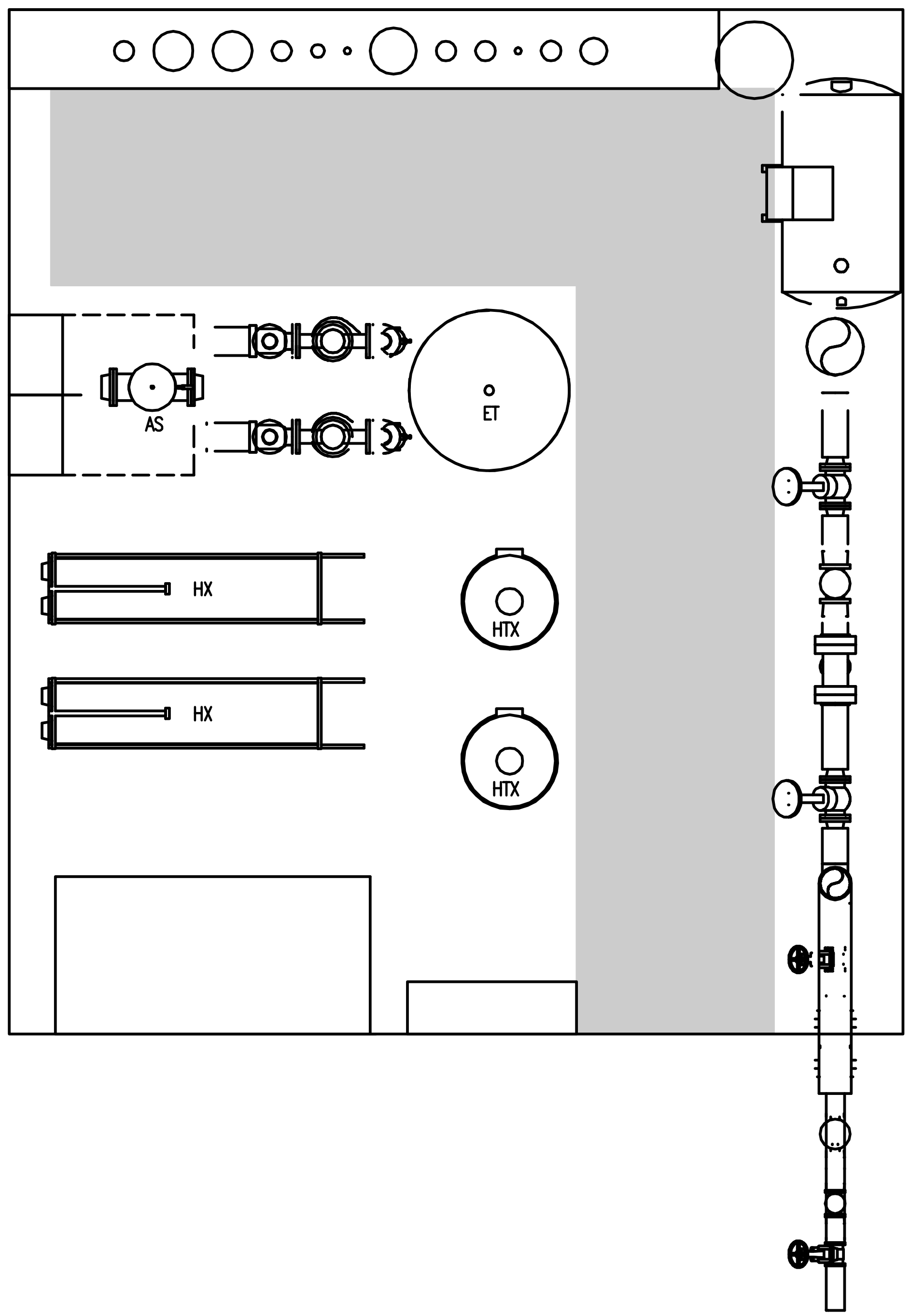
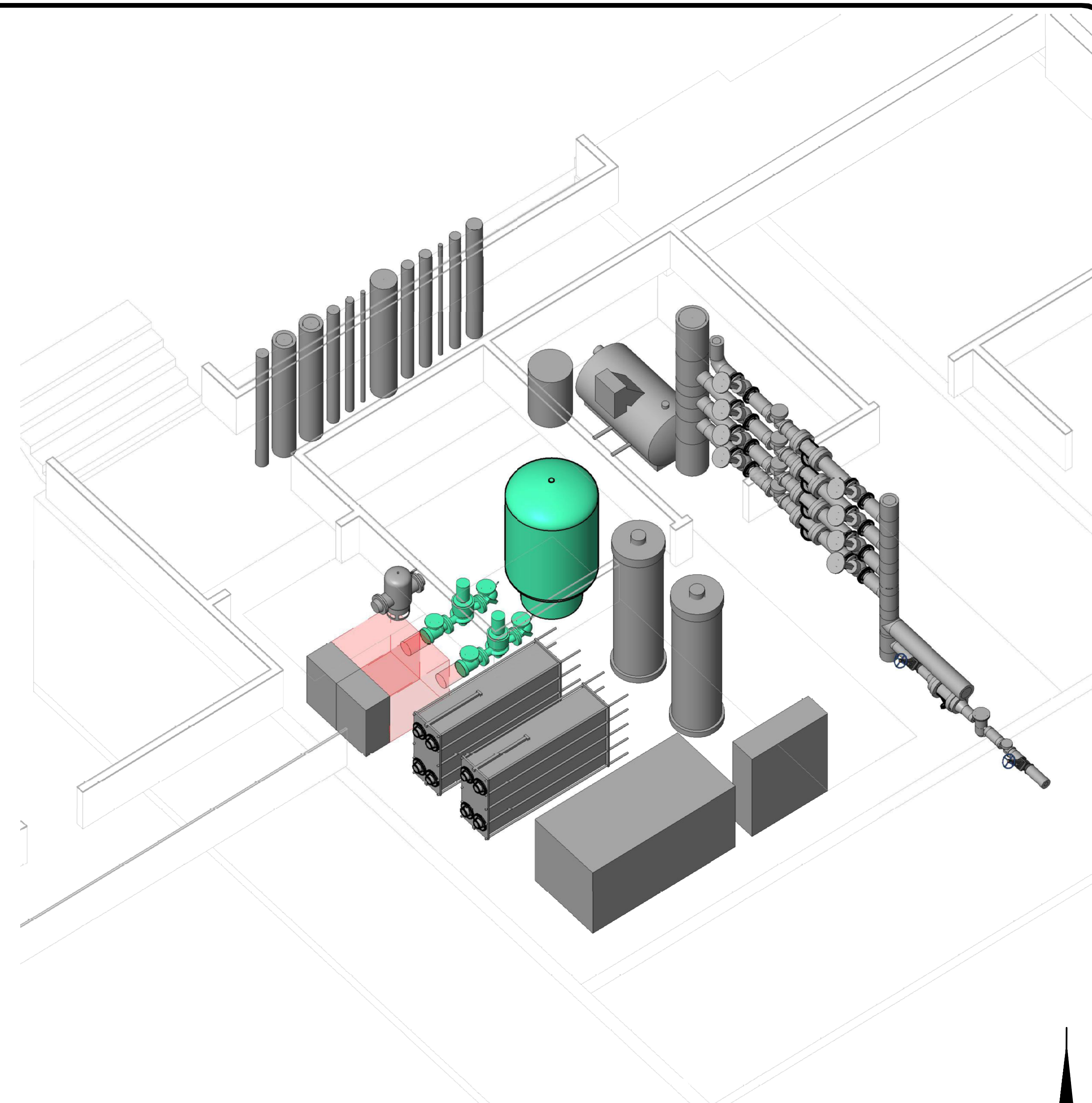
JOB No: E10211
SCALE: 1:200
DWG. No.: MSK-06



WET MECHANICAL ROOM LAYOUT (1:50)



WET MECHANICAL ROOM 3D RENDERING

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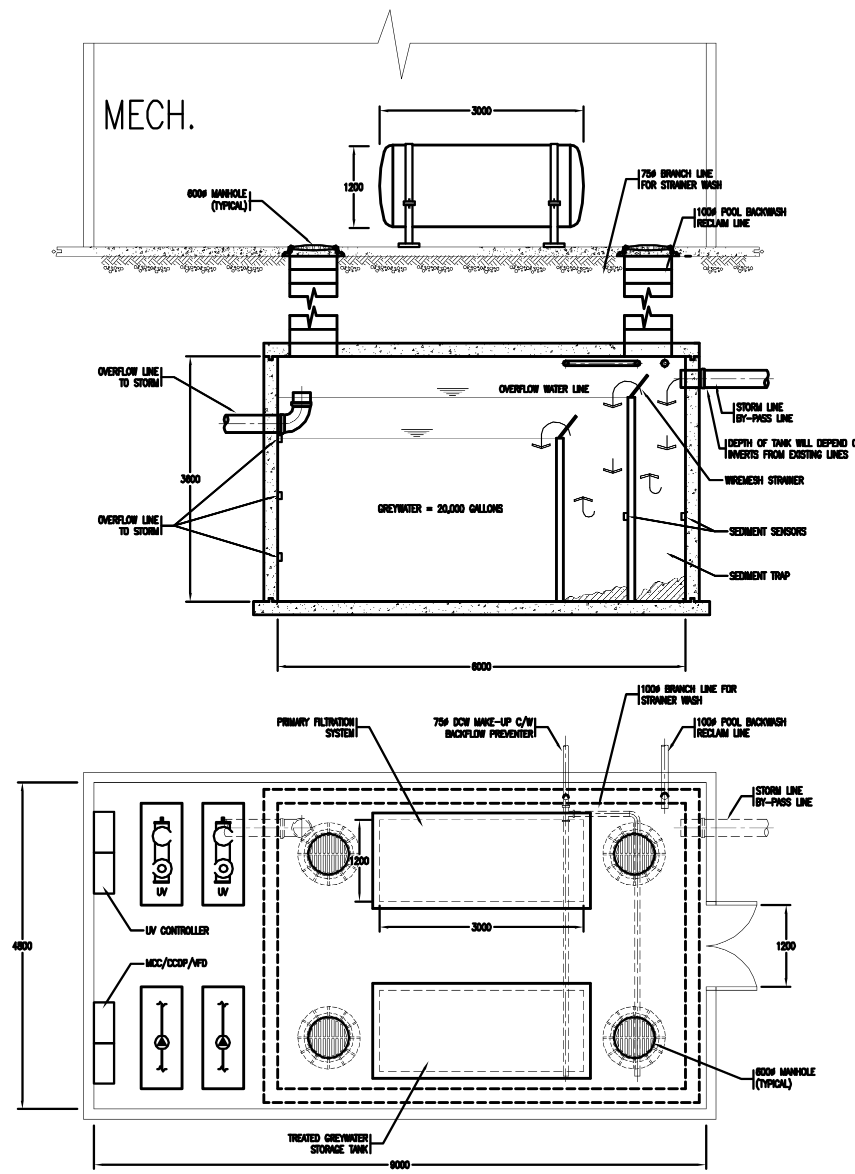
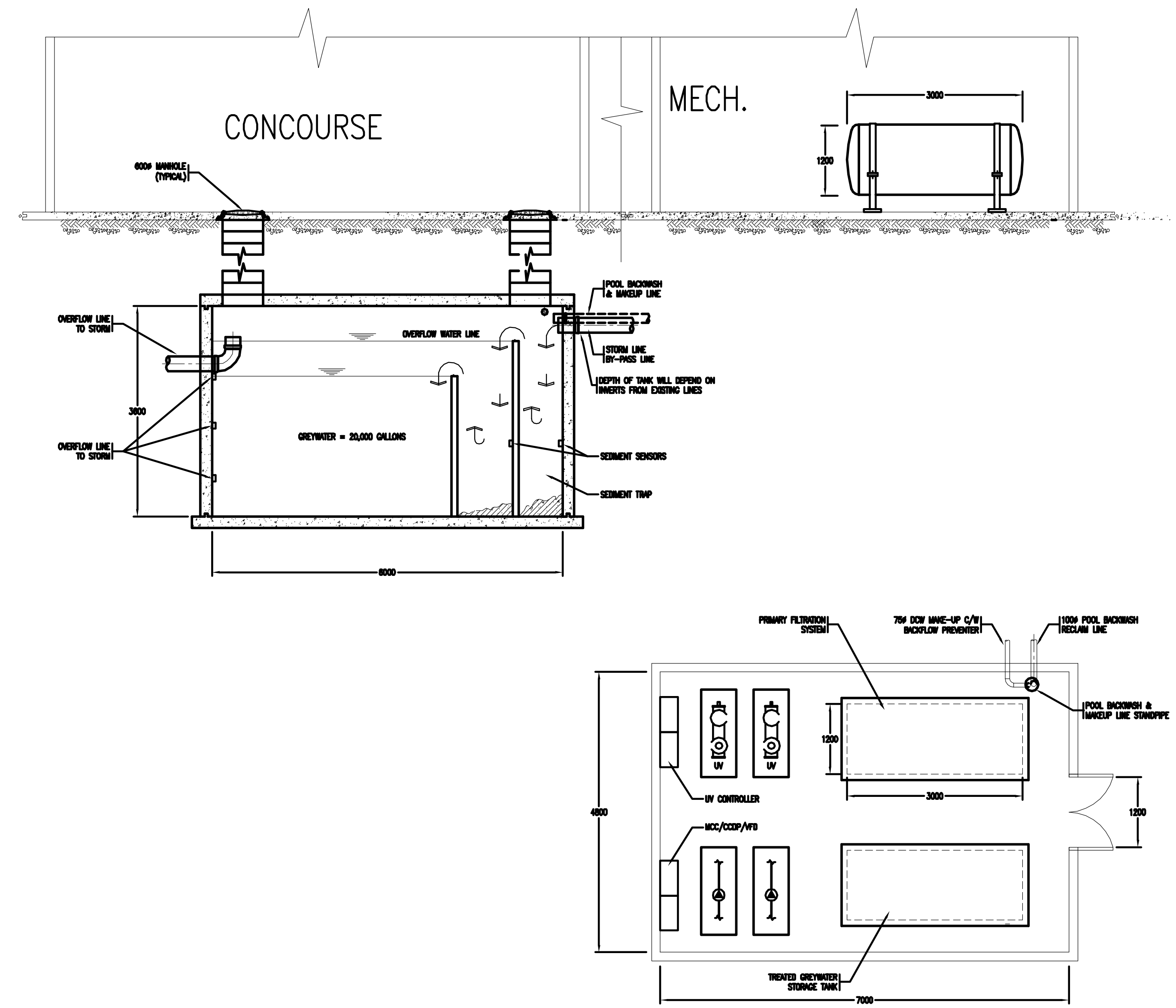
CONSULTING ENGINEERS
* EDMONTON * CALGARY * ATLANTA *

DRAWING: WET MECHANICAL ROOM LAYOUT		**PROJECT:** UNIVERSITY OF ALBERTA PAW CENTRE	
DATE: 2011-02-28	**JOB No:** E10211	**SCALE:** N.T.S	**DWG. No.:** MSK-07



1 GRAY WATER FILTRATION ROOM (CISTERN BELOW FILTER ROOM)
AS NOTED



2 GRAY WATER FILTRATION ROOM (CISTERN BELOW CONCOURSE)
AS NOTED

HEMISPHERE ENGINEERING INC.
CONSULTING ENGINEERS
* EDMONTON * CALGARY * ATLANTA *

DRAWING: GREY WATER TREATMENT SYSTEM

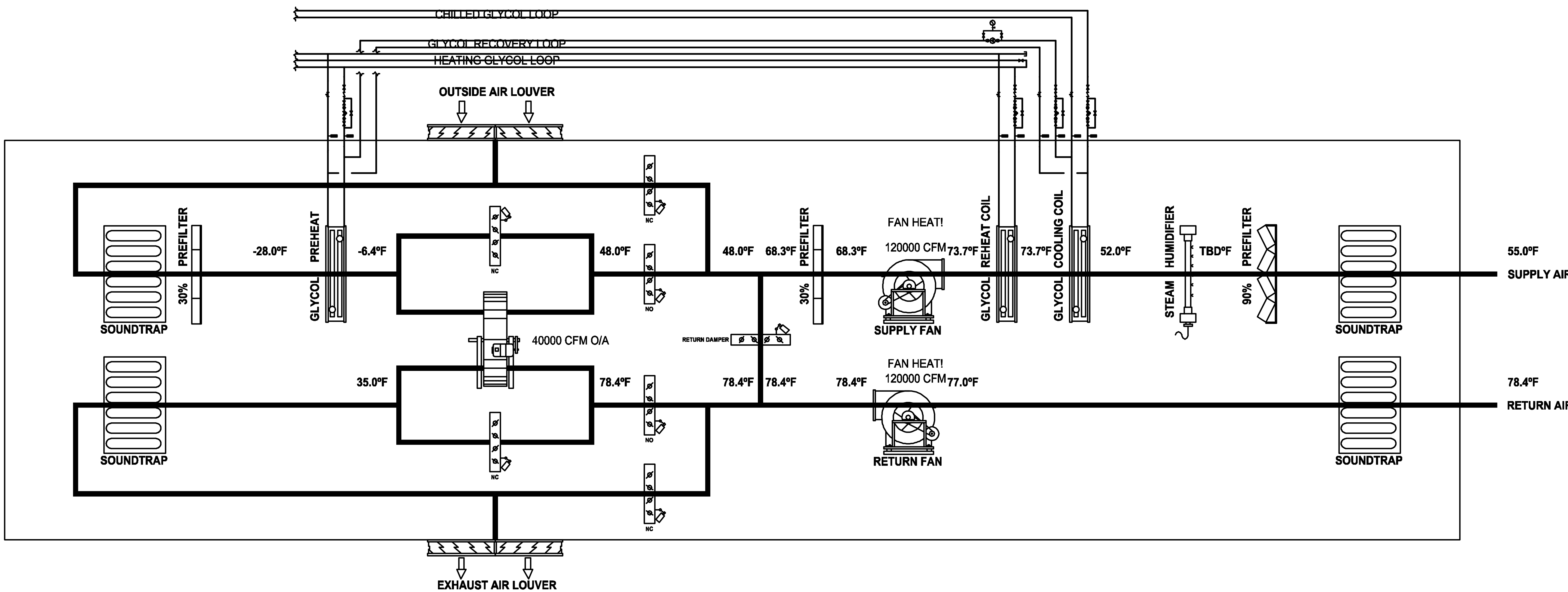
PROJECT: UNIVERSITY OF ALBERTA PAW CENTRE

DATE: 2011-02-28

JOB No: E10211

SCALE: 1:100

DWG. No.: MSK-08



HEMISPHERE ENGINEERING INC.
CONSULTING ENGINEERS
* EDMONTON * CALGARY * ATLANTA *

DRAWING:	MECHANICAL SCHEMATICS (AHU-01, SINGLE 120,000 CFMUNIT)			**PROJECT:**	UNIVERSITY OF ALBERTA PAW CENTRE
DATE:	2011-02-28	**JOB No:**	E10211	**SCALE:**	N.T.S
				DWG. No.:	MSK-09

Group2 architecture engineering

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P.A.W. CENTER

Preliminary Equipment List (10%, In Progress)

By: RDN/KAG

Date Issued: 12/14/2010

Job Number: E10211

Systems										
Unit No.	QTY.	Unit Description	Location	Capacity	Model Description	Electrical			Weight (lbs)	Remarks
						Hp	V/ph	Emerg.		
HYDRONIC SYSTEMS										
P-01	1	Chilled Water (Lead) Pump	Wet Mechanical Room	800 gpm	Armstrong	30 Hp	575/3	-	600	c/w VFD
P-02	1	Chilled Water (Standby) Pump	Wet Mechanical Room	800 gpm	Armstrong	30 Hp	575/3	-	600	c/w VFD
P-03	1	Heating Hot Water (Lead) Pump	Wet Mechanical Room	400 gpm	Armstrong	15 Hp	575/3	-	400	c/w VFD
P-04	1	Heating Hot Water (Standby) Pump	Wet Mechanical Room	400 gpm	Armstrong	15 Hp	575/3	-	400	c/w VFD
P-05	1	Condenser Water (Lead) Pump	Wet Mechanical Room	200 gpm	Armstrong	7.5 Hp	575/3	-	300	c/w VFD
P-06	1	Condenser Water (Standby) Pump	Wet Mechanical Room	200 gpm	Armstrong	7.5 Hp	575/3	-	300	c/w VFD
P-07	1	Solar Hot Water (Lead) Pump	Penthouse	300 gpm	Armstrong	5 Hp	575/3	-	200	Constant Volume
P-08	1	Solar Hot Water (Standby) Pump	Penthouse	300 gpm	Armstrong	5 Hp	575/3	-	200	Constant Volume
P-09	2	Elevator Duplex Sump Pit Pump	Near Elevator	100 gpm	Meyers	1 Hp	575/3	-	100	Duplex Arrangement (Typical for 2)
P-10	1	Duplex Grey Water Booster Dist. Pump A	Grey Water Filtration Room	300 gpm	Armstrong	15 Hp	575/3	-	400	65psi booster pump duplex
P-11	1	Duplex Grey Water Booster Dist. Pump B	Grey Water Filtration Room	300 gpm	Armstrong	15 Hp	575/3	-	400	65psi booster pump duplex
P-12	1	Steam Condensate Duplex Pump A	Wet Mechanical Room	-	Meyers	1 Hp	575/3	-	200	-
P-13	1	Steam Condensate Duplex Pump B	Wet Mechanical Room	-	Meyers	1 Hp	575/3	-	200	-
P-14	1	DHW Recirculation Pump	Penthouse	35 gpm	Armstrong	Frac.	120/1	-	100	-
P-15	1	In-Slab Dist Pumps	Level 3 West Mechanical Room	100 gpm	Armstrong	5 Hp	575/3	-	200	c/w VFD
P-16	1	In-Slab Dist Pumps	Level 3 West Mechanical Room	100 gpm	Armstrong	5 Hp	575/3	-	200	c/w VFD
TK-1	1	Heating Water Expansion	Wet Mechanical Room	-	Wessels	-	-	-	300	-
TK-2	1	Chilled Water Expansion	Wet Mechanical Room	-	Wessels	-	-	-	100	-
TK-3	1	Condenser Water Expansion	Wet Mechanical Room	-	Wessels	-	-	-	100	-
TK-4	1	Solar Hot Water Storage Tank	Penthouse	3,000 gal	A.O. Smith	-	-	-	28,808	(Approximate Wet Weight)
TK-05	1	Pool Backwash Receiver and Pump Package	East Mechanical Room	2,000 gal	A.O. Smith	1 Hp	575/3	-	19,205	(Approximate Wet Weight)
DHWT-01	1	Domestic Hot Water Storage Tank	Penthouse	1,000 gal	A.O. Smith	-	-	-	9,603	(Approximate Wet Weight)
DHWT-02	1	Domestic Hot Water Storage Tank	Penthouse	1,000 gal	A.O. Smith	-	-	-	9,603	(Approximate Wet Weight)
GWT-01	1	Grey Water Storage Tank	20'-30' below the concourse	20,000 gal	PreCon	-	-	-	192,050	Precast with Manhole Extender Rings
HE-01A	1	Steam/Hot water Converter	Wet Mechanical Room	-	Armstrong	-	-	-	300	Shell and Tube Heat Exchanger
HE-01B	1	Steam/Hot water Converter	Wet Mechanical Room	-	Armstrong	-	-	-	300	Shell and Tube Heat Exchanger
HE-02A	1	Hot water to Glycol Converter	Wet Mechanical Room	-	Armstrong	-	-	-	300	Plate and Frame Heat Exchanger
HE-02B	1	Hot water to Glycol Converter	Wet Mechanical Room	-	Armstrong	-	-	-	300	Plate and Frame Heat Exchanger
HE-03A	1	DHW Instantaneous Hotwater Heater	Mechanical Room	-	Armstrong	-	-	-	300	Shell and Tube Heat Exchanger
HE-03B	1	DHW Instantaneous Hotwater Heater	Mechanical Room	-	Armstrong	-	-	-	300	Shell and Tube Heat Exchanger
HE-04A	1	Chillerplant Condenser Water Loop In-Slab Reclaim	Mechanical Room	-	Armstrong	-	-	-	300	Plate and Frame Heat Exchanger
HE-04B	1	Chillerplant Condenser Water Loop In-Slab Reclaim	Mechanical Room	-	Armstrong	-	-	-	300	Plate and Frame Heat Exchanger
HE-05A	1	Water/Water Converter (Chilled Water)	Mechanical Room	-	Armstrong	-	-	-	300	Plate and Frame Heat Exchanger
HE-05B	1	Water/Water Converter (Chilled Water)	Mechanical Room	-	Armstrong	-	-	-	300	Plate and Frame Heat Exchanger
AIR SYSTEMS										
AHU-01	1	DDOAS Heat Recovery Ventilator / AHU	Penthouse	120,000 CFM	Scotts Springfield	SF=2@100HP RF=2@50HP ERV=1HP	575/3	-	70,000	Variable Volume AHU Dedicated Outdoor Air System C/W VFD's

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P.A.W. CENTER

Preliminary Equipment List (10%, In Progress)

By: RDN/KAG

Date Issued: 12/14/2010

Job Number: E10211

Systems										
Unit No.	QTY.	Unit Description	Location	Capacity	Model Description	Electrical			Weight (lbs)	Remarks
						Hp	V/ph	Emerg.		
AHU-02	1	Concourse Ventilator C/W Enthalpy Wheel	Penthouse	15,000 CFM	Scotts Springfield	SF=25HP RF=15HP ERV=1HP	575/3	-	20,000	Variable Volume 100% O/A C/W VFD's
AC-01	1	Main Electrical Room	Sub Basement	6 Ton	Carrier	MCA=34.3 FLA= 41.0	208/1	-	800	C/W low ambient kit and Coil Kit
AC-02	1	Main Telecom Room	Sub Basement	3 Ton	Carrier	MCA=21.9 FLA= 25.2	208/1	-	400	C/W low ambient kit and Coil Kit
AC-03	1	Level 1 Electrical Closet	Electrical Room	2 tons	Carrier	MCA=14.6 FLA= 17.2	208/1	-	200	C/W low ambient kit and Coil Kit
AC-04	1	Level 1 Telecom Closet	Telecom Room	2 tons	Carrier	MCA=14.6 FLA= 17.2	208/1	-	200	C/W low ambient kit and Coil Kit
AC-05	1	Level 2 Electrical Closet	Electrical Room	2 tons	Carrier	MCA=14.6 FLA= 17.2	208/1	-	200	C/W low ambient kit and Coil Kit
AC-06	1	Level 2 Telecom Closet	Telecom Room	2 tons	Carrier	MCA=14.6 FLA= 17.2	208/1	-	200	C/W low ambient kit and Coil Kit
TF-01	10	Transfer Fan	Varies	-	Greenheck	1/4	120/1	-	50	Interlocked to Terminal Box(s)
EF-01	1	General Exhaust Fan	Penthouse	-	Greenheck	3.0	575/3	-	200	Interlocked to FC-01
EF-02	1	General Exhaust Fan	Penthouse	-	Greenheck	3.0	575/3	-	200	Interlocked to FC-02
EF-03	1	General Exhaust Fan	Penthouse	-	Greenheck	3.0	575/3	-	200	Interlocked to FC-03
EF-04	1	General Exhaust Fan	Penthouse	-	Greenheck	7.5	575/3	-	300	-
FC-01	1	Wet Mechanical Room Ventilator	Wet Mechanical Room	-	Carrier	5.0	575/3	-	400	Interlocked to EF-01
FC-02	1	Penthouse Ventilator	Penthouse	-	Carrier	5.0	575/3	-	400	Interlocked to EF-02
FC-03	1	Penthouse Ventilator	Penthouse	-	Carrier	5.0	575/3	-	400	Interlocked to EF-03
E-01	TBD	Standard Exhaust Grille	Varies	-	Price	-	-	-	-	-
R-01	TBD	Standard Return Grille	Varies	-	Price	-	-	-	-	-
R-02	TBD	Linear Return Grille	Varies	-	Price	-	-	-	-	-
S-01	TBD	Standard Supply Air Diffuser	Varies	-	Price	-	-	-	-	-
S-02	TBD	Double Deflection Supply Grille	Varies	-	Price	-	-	-	-	-
S-03	TBD	Linear Supply Grilles	Varies	-	Price	-	-	-	-	-
S-04	TBD	High Flow/Throw Supply Air Drum Diffuser	Varies	-	Price	-	-	-	-	-
S-05	TBD	Architectural Plaque Supply Air Diffuser	Varies	-	Price	-	-	-	-	-
S-06	TBD	Louvered Supply Air Grille	Varies	-	Price	-	-	-	-	-
S-07	TBD	High CFM, High Throw Circular Diffuser	Varies	-	Price	-	-	-	-	-
S-08	TBD	High Flow/Throw Supply Air Nozzle	Varies	-	Price	-	-	-	-	-
S-09	TBD	Linear Flow-Bar Diffuser	Varies	-	Price	-	-	-	-	Two slot, can be curved if required
S-10	TBD	Linear Flow-Bar Diffuser	Varies	-	Price	-	-	-	-	Four slot, can be curved if required
L-01	TBD	Louvers	Penthouse	-	Price	-	-	-	-	Standard 6" drainable louver
CF-01	TBD	Ceiling Fans	Fitness Centre	-	Canarm	Frac.	120/1	-	50	High Performance Ceiling Fans
CF-02	TBD	Ceiling Fans	Fitness Centre	-	Big Ass Fans	1.0	208/3	-	300	Powerfoil
RAD-01	TBD	Finned Tube Radiators	Varies	-	Engineered Air	-	-	-	-	-
RAD-02	TBD	Convector Radiators	Varies	-	Engineered Air	-	-	-	-	-
RAD-03	TBD	RF Radiators	Varies	-	Runtal Radiators	-	-	-	-	-
RAD-04	TBD	UFLT Radiators	Varies	-	Runtal Radiators	-	-	-	-	-
RAD-05	TBD	Curved Radiators	Varies	-	Runtal Radiators	-	-	-	-	-
FF-01	TBD	Cabinet Unit Heaters	Varies	-	Engineered Air	Frac.	120/1	-	-	-
FF-02	TBD	Forced Convection Radiators	Varies	-	Engineered Air	Frac.	120/1	-	-	-

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Preliminary Equipment List (10%, In Progress)

By: RDN/KAG

Date Issued: 12/14/2010

Job Number: E10211

Systems										
Unit No.	QTY.	Unit Description	Location	Capacity	Model Description	Electrical			Weight (lbs)	Remarks
						Hp	V/ph	Emerg.		
UH-01	TBD	Vertical Unit Heaters	Varies	-	Engineered Air	Frac.	120/1	-	-	-
UH-02	TBD	Horizontal Unit Heaters	Varies	-	Engineered Air	Frac.	120/1	-	-	-
RP-01	TBD	Radiant Panel	Varies	-	TWA Panels	-	-	-	-	Installed in perimeter t-bar ceiling
RP-02	TBD	Radiant Panel	Varies	-	TWA Panels	-	-	-	-	Sloped linear panel in t-bar ceiling
RP-03	TBD	Radiant Panel	Varies	-	TWA Panels	-	-	-	-	Linear panels at perimeter wall in gyroc ceiling
RP-04	TBD	Radiant Panel	Varies	-	TWA Panels	-	-	-	-	Slot diffuser in linear panel
RP-05	TBD	Radiant Panel	Varies	-	TWA Panels	-	-	-	-	Slot diffuser in linear panel behind bulkhead
RP-06	TBD	Radiant Panel	Varies	-	TWA Panels	-	-	-	-	Wall mount panel
TB-01	2	VAV Box	Varies	24"x14"	-	-	-	-	-	Size 14 Supply Box C/W reheat coil and 6' acoustic lining downstream Terminal Box
TB-02	4	VAV Box	Varies	16"	-	-	-	-	-	Size 12 Supply Box C/W reheat coil and 6' acoustic lining downstream Terminal Box
TB-03	6	VAV Box	Varies	14"	-	-	-	-	-	Size 14 Supply Box C/W reheat coil and 6' acoustic lining downstream Terminal Box
TB-04	2	VAV Box	Varies	12"	-	-	-	-	-	Size 12 Supply Box C/W reheat coil and 6' acoustic lining downstream Terminal Box
TB-05	10	VAV Box	Varies	10"	-	-	-	-	-	Size 12 Supply Box C/W reheat coil and 6' acoustic lining downstream Terminal Box
TB-06	20	VAV Box	Varies	8"	-	-	-	-	-	Size 12 Supply Box C/W reheat coil and 6' acoustic lining downstream Terminal Box
TB-07	6	VAV Box	Varies	6"	-	-	-	-	-	Size 10 Supply Box C/W reheat coil and 6' acoustic lining downstream Terminal Box
TB-08	0	VAV Box	Varies	4"	-	-	-	-	-	Size 10 Supply Box C/W reheat coil and 6' acoustic lining downstream Terminal Box
SPECIALTY EQUIPMENT										
Manifold-01	-	In Floor Heating	Change Rooms / East Mech Room	-	-	-	-	-	-	
Manifold-02	-	In Floor Heating	Change Rooms / East Mech Room	-	-	-	-	-	-	
Manifold-03	-	In Floor Heating	Change Rooms / East Mech Room	-	-	-	-	-	-	
	-	TWO COMPARTMENT OIL SEPERATOR	ELEVATOR MACHINE ROOM underslab	-	-	-	-	-	-	-
	-	Grease Interceptor	Kitchen?	-	-	-	-	-	-	-

Hazardous Materials Survey Report

AP Solutions and Resources

Limited Hazardous Materials Survey Report

Van Vliet Physical Education Centre - East
Van Vliet Physical Education Centre - West
Universiade Pavilion
University of Alberta Campus

February 2011
Project #: 2010-54 HAZMAT

1139 115 St SW
Edmonton, AB T6W 1W6
(780) 328-4628
www.apsr.ca

Executive Summary

AP Solutions and Resources (APSR) was requested by the University of Alberta to conduct a limited asbestos materials survey of Van Vliet Physical Education Centre East, Van Vliet Physical Education Centre West and UniversiadeUniversiade Pavilion located at the University of Alberta in Edmonton. The scope of work for this project was to identify the existence and condition of asbestos-containing materials. Based on the sample results, site observations and previous mechanical room surveys conducted on the sites, APSR outlines the following findings:

Substance	Material	Description	Location
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Parging Mud on Duct	Van Vliet East E-25
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Pipe Fitting Insulation	Van Vliet East E-19ZZ
Asbestos 50 - 75% Amosite	Mechanical	White Pipe Run Insulation	Van Vliet East E-06
Asbestos 1 - 5% Chrysotile	Flooring	White Floor Levelling Compound (cement-like)	Van Vliet East E-126ZZ
Asbestos 1 - 5% Chrysotile	Flooring	White Floor Levelling Compound (cement-like)	Van Vliet East E-439ZZ
Asbestos 1 - 5% Chrysotile	Wall	Beige Drywall Joint Compound	Van Vliet East E-431
Asbestos 5 - 10% Chrysotile	Flooring	White Floor Levelling Compound (cement-like)	Van Vliet East E-08
Asbestos 25 – 50% Chrysotile	Mechanical	Grey Parging Mud on Duct	Van Vliet East EB-2
Asbestos 10 – 25% Chrysotile	Mechanical	Grey Pipe Fitting Insulation	Van Vliet East EB-2

Substance	Material	Description	Location
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Parging Mud on Tank	Van Vliet East EB-2
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Valve Fitting Insulation	Van Vliet East EB-2
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Parging Mud on Duct	Van Vliet East EB-2
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Pipe Fitting Insulation	Van Vliet East EB-2
Asbestos 10 - 25% Chrysotile	Mechanical	Grey Parging Mud on Duct	Van Vliet East EB-2
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Valve Fitting Insulation	Van Vliet East EB-2
Asbestos 50 - 75% Chrysotile	Mechanical	Grey Pipe Fitting Insulation	Van Vliet East EB-2
Asbestos 10 - 25% Chrysotile	Mechanical	Grey Pipe Fitting Insulation	Van Vliet East E-416
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Valve Fitting Insulation	Van Vliet East E-416
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Parging Mud on Duct	Van Vliet East E-416
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Parging Mud on Duct	Van Vliet East E-416

Substance	Material	Description	Location
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Valve Fitting Insulation	Van Vliet East E-416
Asbestos 10 - 25% Chrysotile	Mechanical	Black Gasket	Van Vliet East E-416
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Valve Fitting Insulation	Van Vliet East E-416
Asbestos 1 - 5% Chrysotile	Flooring	Grey floor leveling compound(cement) with black mastic	Van Vliet East E-24
Asbestos > 75% Chrysotile	Mechanical	Grey Pipe Fitting Insulation	Van Vliet West W-018
Asbestos 1 - 5% Chrysotile	Wall	White Drywall Joint Compound	Van Vliet West W-055
Asbestos 50 - 75% Amosite	Mechanical	Grey Pipe Run Insulation	Van Vliet West W-095A
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Pipe Fitting Insulation	Van Vliet West W-010J
Asbestos 25 - 50% Amosite	Ceiling	Grey Ceiling Tile (2×4)	Van Vliet West W-003
Asbestos 50 - 75% Amosite	Mechanical	White Pipe Run Insulation	Van Vliet West W-013
Asbestos > 75% Chrysotile	Mechanical	Grey Pipe Fitting Insulation	Van Vliet West W1-059

Substance	Material	Description	Location
Asbestos 1 - 5% Chrysotile	Wall	White Drywall Joint Compound	Van Vliet West W2-063ZZ
Asbestos 1 - 5% Chrysotile	Wall	White Drywall Joint Compound	Van Vliet West W-078D
Asbestos 1 - 5% Chrysotile	Wall	White Drywall Joint Compound	Van Vliet West W-083
Asbestos 10 - 25% Chrysotile	Mechanical	Grey Parging Mud on Duct	Van Vliet West W2-66
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Pipe Fitting Insulation	Van Vliet West W2-66
Asbestos 1 - 5% Chrysotile	Mechanical	Grey Valve Fitting Insulation	Van Vliet West W2-66
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Parging Mud on Duct	Van Vliet West W2-66
Asbestos 1 - 5% Chrysotile	Flooring	Black Mastic	Van Vliet West W2-66
Asbestos 50 - 75% Chrysotile	Mechanical	Grey Exhaust Parging off Emergency Generator	Van Vliet West W2-66A
Asbestos 25 - 50% Chrysotile	Mechanical	Grey Pipe Fitting Insulation	Van Vliet West W2-66A
Asbestos 75 - 100% Chrysotile	Mechanical	Black Gasket	Van Vliet West W-88C

Substance	Material	Description	Location
Asbestos 10 - 25% Chrysotile	Miscellaneous	Grey Debris on Floor	Van Vliet West W-88C
Asbestos 25 - 50% Amosite	Mechanical	Brown Cast Iron Joint Packing	Universiade Pavilion P-256
Asbestos 5 - 10% Chrysotile	Mechanical	Amber Duct Mastic	Universiade Pavilion P-356
Asbestos 1 - 5% Chrysotile	Mechanical	Black Duct Mastic	Universiade Pavilion P-356A
Asbestos 5 - 10% Chrysotile	Mechanical	Red Duct Mastic	Universiade Pavilion P- 358
Asbestos 5 - 10% Chrysotile	Mechanical	Brown Parging (contaminate) under medal cladding	Universiade Pavilion P-358
Asbestos 1 - 5% Chrysotile	Mechanical	Red Duct Mastic	Universiade Pavilion P-511

Recommendations

Prior to renovation activities, all identified asbestos-containing materials that may become impacted must be abated according to the asbestos abatement procedures as outlined by the *Alberta Asbestos Abatement Manual* (July 2009) published by Employment and Immigration, Workplace Health and Safety.

If any asbestos abatement is scheduled to occur within the rooms, it should be conducted by qualified personnel who are trained in working with asbestos. A qualified environmental consultant must also be present during all forms of asbestos abatement to ensure that appropriate work procedures are followed and to conduct appropriate air monitoring during the asbestos abatement process. They also ensure all contamination is contained and asbestos-containing materials are disposed of appropriately.

Van Vliet Centre East

1. Asbestos-containing tank parging, duct parging, floor leveling compound and pipe run insulation that may be impacted during future renovation activities should be abated following high-risk procedures as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).
2. Asbestos-containing drywall joint compound that may be impacted during future renovation activities should be abated following moderate-risk abatement procedures or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).
3. Asbestos-containing pipe fitting insulation that may be impacted during future renovation activities should be abated following a combination of moderate-risk glovebag and low-risk wrap and cut abatement procedures (if the lines are abandoned), or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).
4. Asbestos-containing black gaskets that may be impacted during future renovation activities should be abated following low-risk abatement procedures, or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).

Van Vliet Centre West

1. Asbestos-containing duct parging, floor leveling compound and pipe run insulation that may be impacted during future renovation activities should be abated following high-risk procedures as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).
2. Asbestos-containing ceiling tiles and drywall joint compound that may be impacted during future renovation activities should be abated following moderate-risk abatement procedures or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).
3. Asbestos-containing pipe fitting insulation that may be impacted during future renovation activities should be abated following a combination of moderate-risk glovebag and low-risk wrap and cut abatement procedures (if the lines are abandoned), or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).
4. Asbestos-containing black gaskets and floor mastic that may be impacted during future renovation activities should be abated following low-risk abatement procedures, or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).

Universiade Pavilion

1. Asbestos-containing cast iron joint packing that may be impacted during future renovation activities should be abated following low-risk wrap and cut abatement procedures, or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).

2. Asbestos-containing duct mastic that may be impacted during future renovation activities should be abated following low-risk abatement procedures, or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).

3. Asbestos containing brown parging (contaminate) should be abated prior to renovation following low-risk procedures or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009). This contaminate was only observed in room P-356A and was not found in any other areas.

Table of Contents

Introduction

AP Solutions and Resources Ltd. (APSR) was requested by the University of Alberta (the client) to conduct a limited asbestos materials surveys Van Vliet Physical Education Centre East, Van Vliet Physical Education Centre West and Universiade Pavilion located at the University of Alberta in Edmonton (the site). Adam Stokowski and Petro Cordero of APSR conducted the investigation and bulk sampling of hazardous materials from January 12 – February 11, 2011.

Scope of Work

The scope of work for this project was to identify the existence and condition of asbestos-containing materials within Van Vliet Physical Education Centre East, Van Vliet Physical Education Centre West and Universiade Pavilion. The survey was conducted by limited sampling, analysis, visual identification and referencing of materials where possible. Further, APSR will make recommendations as to the appropriate removal and disposal of these materials in order to meet all known current laws and ordinances in the province of Alberta to allow for renovations within the site. The investigation was conducted in a non-destructive to semi-destructive nature. *Note: Sample results from previous mechanical room surveys have been added to complete this report.*

Methods and Procedures

The investigation included bulk sampling of one hundred and thirty two (132) suspect asbestos-containing materials throughout the sites. This involved inspecting wall materials, flooring materials, ceiling materials, mechanical piping, mechanical ducts, and electrical insulation. Due to the semi-destructive nature of this investigation accessibility above ceiling spaces and within wall cavities was limited.

Asbestos

Systematic sampling of all identified suspect asbestos-containing materials was conducted as part of this investigation. Suspect asbestos-containing samples were analyzed for asbestos type and percentage content using Polarized Light Microscopy in accordance with National Institute of Occupational Safety and Health (NIOSH) methodologies and dispersion staining techniques (40 CFR Part 763, Vol. 52, No. 210).

The investigation involved an inspection of the building and building systems to assess the type and extent of asbestos-containing materials in the rooms. The systems that were reviewed as part of the inspection are as follows:

- *Structural* - systems including fireproofing on: open and solid webbed joist systems;

- *Mechanical* - systems insulation including: hot water and steam system, condensate system, chilled water system, domestic hot and cold water, generator exhaust, boiler units, heat exchangers, reboiler units, asbestos cement piping, wall joint compound, asbestos sheet products; and

- *Architectural* - systems including: texture coats, vinyl sheet flooring, vinyl floor tile, condensation control applications, ceiling tile, wall board, and drywall joint compound.

Health and Safety Regulations and Guidelines

Alberta Occupational Health and Safety (OHS) Act, Regulation and Code

The Alberta OH&S Act, Regulation and Code are Alberta laws intended to protect the health and safety of workers at the workplace. Employment and Immigration (EI) is the government department responsible for administering the *Act*. EI does this by:

- consulting with employers and workers on the development of safe and healthy work practices and programs;
- conducting workplace inspections;
- investigating serious work-related incidents and injuries; and
- responding to concerns about health and safety conditions at Alberta work sites.

The Act, Regulation and Code hold both the employer and employee responsible for maintaining a safe work environment. Applicable sections of the Code include Part 2 - *Hazard Assessment, Elimination and Control* and Part 4 - *Chemical Hazards, Biological Hazards and Harmful Substances*.

Occupational Exposure Limits

Schedule 1, Table 2, *Chemical Substances* of the Code establishes occupational exposure limits (OELs) for a variety of airborne contaminants including asbestos. The OEL for a particular contaminant represents conditions to which it is believed that nearly all workers may be exposed, day after day, without suffering from adverse health effects. An eight-hour OEL refers to the maximum concentration, averaged over eight hours, to which a worker can be exposed.

Prohibitions Related to Asbestos

Sections 31 to 35 of the Code outline requirements for the management of asbestos within buildings. The following uses of asbestos are prohibited in new or existing buildings:

- the use of materials containing Crocidolite (blue) asbestos;
- the use of asbestos-containing materials in a supply or return air plenum;
- the installation of a product that has the potential for releasing asbestos fibres in a building. Asbestos cement pipe and asbestos cement board are exceptions as long as they are not installed in a supply or return air plenum; and
- the installation of asbestos by spray application.

In existing buildings where there is a potential for the release of asbestos fibres, an Alberta Workplace Health and Safety Representative may declare an unsafe condition. In this case, the material must be removed, enclosed or encapsulated.

If an area within a building is being altered or renovated, any materials that have the potential for releasing asbestos fibres in that area must be removed, enclosed or encapsulated. In buildings or parts of buildings that are being demolished, materials having the potential for releasing asbestos fibres must first be removed.

Alberta Asbestos Abatement Manual

The *Alberta Asbestos Abatement Manual* (July 2009) is a guidance document published by Employment and Immigration, Workplace Health and Safety. The manual outlines the minimum work standards and methods necessary to meet the legislative requirements of working with asbestos in Alberta. The *Alberta Asbestos Abatement Manual* provides a written interpretation of the requirements for ensuring compliance within the OHS Act, Regulation and Code. It covers basic information on asbestos, its health hazards and requirements for worker protection.

Hazardous Materials Details

Van Vliet Physical Education Centre East

University of Alberta Campus

February 2011
Project #: 2010-54 HAZMAT

Results

Asbestos

A total of fifty (50) samples of building materials were collected and submitted for analysis for asbestos content. The bulk sample results are provided in Table 1: Asbestos Analytical Results. The laboratory analysis report is attached in Appendix I. Site photographs of the asbestos-containing materials are attached in Appendix II. Sampling locations are attached in Appendix III. **Note: Table 2 contains analytical results from a separate survey report of the mechanical rooms and has been added to complete the limited survey. The previous mechanical room survey data does not reflect any abatement that may have occurred since the mechanical room survey had been conducted.*

Table 1: Asbestos Analytical Results(1)

Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
1	**Mechanical**	**Grey Parging Mud on Duct**	**Centre of E-25**	**Chrysotile**	**25 - 50%**
2	Flooring	Brown Vinyl Floor Tile (12"x12") w/ White and Brown Streaks	East Side of E-19ZZ	None Detected	NA
3	Flooring	Black Mastic/Glue	SE Corner of E-19ZZ	None Detected	NA
4	Ceiling	Brown (2X4) Ceiling Tile w/ Small Pinholes and Non-Directional Fissures	North Side of E-19ZZ	None Detected	NA
5	**Mechanical**	**Grey Pipe Fitting Insulation**	**Centre of E-19ZZ**	**Chrysotile**	**25 - 50%**
6	Flooring	Grey Vinyl Floor Tile (12"x12") W/ Brown Streaks	South Side of E-19ZZ	None Detected	NA

Note:
1. Bold values indicate positive for asbestos-containing

Table 1: Asbestos Analytical Results(1)

Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
7	Ceiling	Grey Acoustic Cement Ceiling Tile w/ Small Pinholes and Large Directional Fissures	South Side of E-19ZZ	None Detected	NA
8	Wall	Grey Plaster (scratch coat)	North Side of E-19A	None Detected	NA
9	Flooring	White Floor Levelling Compound (cement-like)	South Side of E-19A	None Detected	NA
10	Wall	White Drywall Joint Compound	SE Corner of E-14	None Detected	NA
11	Flooring	Grey Floor Levelling Compound (cement-like)	NE Corner of E-14	None Detected	NA
12	Wall	White Drywall Joint Compound	SW Corner of E-13	None Detected	NA
13	Flooring	Beige Vinyl Floor Tile (12"x12") w/ Brown Streaks	East Side of E-06	None Detected	NA
14	**Mechanical**	**White Pipe Run Insulation**	**West Side of E-06**	**Amosite**	**50 - 75%**
15	Wall	White Drywall Joint Compound	North Side of E-121ZZ	None Detected	NA
16	Flooring	Black Mastic/Glue	West Side of E-121ZZ	None Detected	NA
17	Flooring	White Floor Levelling Compound (cement-like)	West Side of E-121ZZ	None Detected	NA

Note:
1. Bold values indicate positive for asbestos-containing

Table 1: Asbestos Analytical Results(1)

Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
18	Ceiling	Grey Acoustic Cement Ceiling Tile w/ Small Pinholes and Large Directional Fissures	NW Corner of E-122ZZ	None Detected	NA
19	Wall	Grey Plaster (scratch coat)	West Side of E-122ZZ	None Detected	NA
20	Ceiling	Grey (2×4) Ceiling Tile w/ Large and Small Pinholes	Centre of E-126ZZ	None Detected	NA
21	**Flooring**	**White Floor Levelling Compound (cement-like)**	**North Side of E-126ZZ**	**Chrysotile**	**1 - 5%**
22	Wall	White Plaster (smooth coat)	NW Corner of E-131	None Detected	NA
23	Wall	Grey Plaster (rough coat)	NW Corner of E-131	None Detected	NA
24	Flooring	Beige Floor Levelling Compound (cement-like)	West Side of E-121C	Chrysotile	<1%
25	Flooring	Grey Floor Levelling Compound (cement-like)	West Side of E-121C	None Detected	NA
26	Wall	Grey Plaster (scratch coat)	North Side of E-312	None Detected	NA
27	Ceiling	Grey Acoustic Cement Ceiling Tile w/ Small Pinholes and Large Directional Fissures	North Side of E-312	None Detected	NA

Note:
1. Bold values indicate positive for asbestos-containing

Table 1: Asbestos Analytical Results(1)

Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
28	Flooring	White Floor Levelling Compound (cement-like)	East Side of E-312	None Detected	NA
29	Flooring	Black Mastic/Glue	East Side of E-312	None Detected	NA
30	Wall	White Drywall Joint Compound	West Side of E-313ZZ	None Detected	NA
31	Wall	Beige Drywall Joint Compound	South Side of E-439ZZ	None Detected	NA
32	Ceiling	Grey Acoustic Cement Ceiling Tile w/ Small Pinholes and Large Directional Fissures	Centre of E-439ZZ	None Detected	NA
33	**Flooring**	**White Floor Levelling Compound (cement-like)**	**South Side of E-439ZZ**	**Chrysotile**	**1 - 5%**
34	Wall	White Drywall Joint Compound	East Side of E-401	None Detected	NA
35	Wall	Grey Vinyl Floor Tile (12"x12")	SE Corner of E-401	None Detected	NA
36	Wall	White Drywall Joint Compound	North Side of E-407	None Detected	NA
37	Flooring	Beige Floor Levelling Compound (cement-like) W/ Black Mastic	East Side of 4-40	None Detected	NA

Note:
1. Bold values indicate positive for asbestos-containing

Table 1: Asbestos Analytical Results[1]

Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
38	Flooring	White Floor Levelling Compound (cement-like) W/ Black Mastic	West Side of 4-40	None Detected	NA
39	Flooring	Black Mastic/Glue	North Side of E-436	None Detected	NA
40	**Wall**	**Beige Drywall Joint Compound**	**NW Corner of E-431**	**Chrysotile**	**1 - 5%**
41	Mechanical	Red Mastic on Duct	North Side of E-455	None Detected	NA
42	Ceiling	Grey Ceiling tile (2×2) w/ Texture	South Side of E-463	None Detected	NA
43	Ceiling	Grey Fireproofing/ Insulation	Centre of E-050	None Detected	NA
44	Wall	White Drywall Joint Compound	Centre of E-050	None Detected	NA
45	Wall	White Drywall Joint Compound	West Side of E-05	None Detected	NA
46	Wall	White Drywall Joint Compound	SE Corner of E-126	None Detected	NA
47	**Flooring**	**White Floor Levelling Compound (cement-like)**	**SE Corner of E-08**	**Chrysotile**	**5 - 10%**
48	Wall	White Plaster (smooth coat)	NW Corner of E-131	None Detected	NA

Note:
1. Bold values indicate positive for asbestos-containing

Table 1: Asbestos Analytical Results[1]

Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
49	Flooring	Beige Floor Levelling Compound (cement-like)	West Side of E-121C	None Detected	NA
50	Wall	Beige Drywall Joint Compound	E-439ZZ	None Detected	NA

Table 2: Previous Mechanical Room Survey Asbestos Analytical Results[1]					
Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
1	Mechanical	Grey Valve Fitting Insulation	North Side of EB-2	None Detected	NA
2	**Mechanical**	**Grey Parging Mud on Duct**	**North Side of EB-2**	**Chrysotile**	**25 - 50%**
3	**Mechanical**	**Grey Pipe Fitting Insulation**	**North Side of EB-2**	**Chrysotile**	**10 - 25%**
4	Mechanical	Black Felt Paper on Duct	Centre of EB-2	None Detected	NA
5	**Mechanical**	**Grey Parging Mud on Tank**	**South Side of EB-2**	**Chrysotile**	**25 - 50%**
6	**Mechanical**	**Grey Valve Fitting Insulation**	**South Side of EB-2**	**Chrysotile**	**25 - 50%**
7	**Mechanical**	**Grey Parging Mud on Duct**	**South Side of EB-2**	**Chrysotile**	**25 - 50%**
8	**Mechanical**	**Grey Pipe Fitting Insulation**	**South Side of EB-2**	**Chrysotile**	**25 - 50%**
9	Mechanical	Grey Valve Fitting Insulation	Centre of EB-2	None Detected	NA
10	Mechanical	Red Mastic on Duct	Centre of EB-2	None Detected	NA
11	**Mechanical**	**Grey Parging Mud on Duct**	**Centre of EB-2**	**Chrysotile**	**10 - 25%**

Note:
1. Bold values indicate positive for asbestos-containing

Hazmat Survey Report - Van Vliet East, Van Vliet West and Universiade Pavilion
University of Alberta
AP Solutions and Resources

Table 2: Previous Mechanical Room Survey Asbestos Analytical Results[1]					
Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
12	**Mechanical**	**Grey Valve Fitting Insulation**	**Centre of EB-2**	**Chrysotile**	**25 - 50%**
13	**Mechanical**	**Grey Pipe Fitting Insulation**	**Centre of EB-2**	**Chrysotile**	**50 - 75%**
14	Mechanical	Grey Parging Mud on Tank	South Side of EB-2	None Detected	NA
15	Flooring	Black Mastic	East side of EB-2A	None Detected	NA
16	Wall	Beige Drywall Joint Compound	East side of E-416	None Detected	NA
17	**Mechanical**	**Grey Pipe Fitting Insulation**	**Centre of E-416**	**Chrysotile**	**10 - 25%**
18	**Mechanical**	**Grey Valve Fitting Insulation**	**Centre of E-416**	**Chrysotile**	**25 - 50%**
19	**Mechanical**	**Grey Parging Mud on Duct**	**SW Corner of E-416**	**Chrysotile**	**25 - 50%**
20	Flooring	Black Mastic	SW Corner of E-416	None Detected	NA
21	**Mechanical**	**Grey Parging Mud on Duct**	**Centre of E-416**	**Chrysotile**	**25 - 50%**
22	**Mechanical**	**Grey Valve Fitting Insulation**	**Centre of E-416**	**Chrysotile**	**10 - 25%**

Note:
1. Bold values indicate positive for asbestos-containing

Table 2: Previous Mechanical Room Survey Asbestos Analytical Results[1]					
Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
23	Wall	Grey Drywall	East Side of E-416	None Detected	NA
24	**Mechanical**	**Black Gasket**	**Centre of E-416**	**Chrysotile**	**50 - 75%**
25	**Mechanical**	**Grey Valve Fitting Insulation**	**East Side of E-416**	**Chrysotile**	**25 - 50%**
26	**Flooring**	**Grey Floor Leveling Compound(Cement) With Black Mastic**	**SW Corner of E-24**	**Chrysotile**	**1 - 5%**

Note:
1. Bold values indicate positive for asbestos-containing

Discussion and Conclusions

Asbestos

Ceiling building materials

Acoustic Cement Ceiling Tile

Four samples of acoustic cement ceiling tiles suspected of containing asbestos were collected during the survey. All four samples of grey acoustic cement ceiling tiles with small pinholes and large directional fissures were found **not** to contain asbestos.

Ceiling tiles

Two samples of (2x4) ceiling tiles and one sample of (2x2) ceiling tile suspected of containing asbestos were collected during the survey. One sample of brown (2x4) ceiling tile with small pinholes and large directional fissures, one sample of grey (2x4) ceiling tile with large and small pinholes and one sample of (2x2) ceiling tile with texture were all found **not** to contain asbestos.

Fireproofing/insulation

One sample of fireproofing/insulation suspected of containing asbestos was collected during the survey. This sample of grey fireproofing/insulation was found **not** to contain asbestos.

Flooring building materials

Floor Levelling Compound

Twelve samples of floor levelling compound suspected of containing asbestos were collected during the survey. Two samples of white floor levelling compound were found to contain **1-5%**

Chrysotile asbestos. One sample of white floor levelling compound was found to contain **5-10% Chrysotile** asbestos.

One sample of floor leveling compound suspected of containing asbestos was collected during a previous survey. This sample of grey floor leveling compound was found to contain **1-5% Chrysotile** asbestos.

Four samples of white floor levelling compound were found **not** to contain asbestos. Two samples of grey floor levelling compound were found **not** to contain asbestos. Three samples of beige floor levelling compound were found **not** to contain asbestos, with one sample found to contain <1% Chrysotile asbestos. This sample was resampled and also found **not** to contain asbestos, therefore it can be concluded that this floor levelling compound does **not** contain asbestos

Asbestos containing floor leveling compound was sampled and visually referenced in the following locations:

First floor
- Rooms E-24, E-19ZZ, E-19A, E-15, E-13, E-08

Second floor
- Rooms E-126ZZ, E-132ZZ

Fourth floor
- Room E-439ZZ

Due to the limitations of the assessment, occupied spaces and the numerous renovations conducted throughout the Site, further sampling of all floor levelling compounds should be undertaken during renovation activities.

Mastic/Glue

Four samples of mastic/glue suspected of containing asbestos were collected during the survey and two samples were collected during a previous survey. All six samples of black mastic/glue were found **not** to contain asbestos.

Vinyl Floor Tiles (12x12)

Four samples of vinyl floor tiles (12x12) suspected of containing asbestos were collected during the survey. One sample of brown vinyl floor tiles (12x12) with white and brown streaks, one sample of grey vinyl floor tiles (12x12) with brown streaks, one sample of grey vinyl floor tiles (12x12) and one sample of beige vinyl floor tiles (12x12) with brown streaks were found **not** to contain asbestos.

Mechanical building materials

Duct Parging

One sample of duct parging suspected of containing asbestos was collected during the survey and five samples of duct parging suspected of containing asbestos were collected during a previous survey.

One sample of grey duct parging was found to contain **10-25% Chrysotile** asbestos and five samples of grey duct parging were found to contain **25-50% Chrysotile** asbestos.

Asbestos containing duct parging was sampled and visually referenced in the following locations:

Basement
- Room EB-2

First floor
- Room E-25

Fourth floor
- Room E-416

Duct Mastic
One sample of duct mastic suspected of containing asbestos was collected during the survey and one sample of duct mastic suspected of containing asbestos was collected during a previous survey. Both samples of red duct mastic were found **not** to contain asbestos.

Felt Paper
One sample of felt paper suspected of containing asbestos was collected during a previous survey. This sample of black felt paper was found **not** to contain asbestos.

Gasket
One black gasket sample suspected of containing asbestos was collected during a previous survey. This sample of black gasket was found to contain **50-75% Chrysotile** asbestos.

Asbestos containing gasket was sampled and visually referenced in the following locations:

Basement
- Room EB-2

Fourth floor
- Room E-416

Pipe Fitting Insulation and Valve Fitting Insulation
One sample of pipe fitting insulation suspected of containing asbestos was collected during this survey and four samples of pipe fitting insulation and seven samples of valve fitting insulation suspected of containing asbestos were collected during a previous survey.

One sample of grey pipe fitting insulation was found to contain **25-50% Chrysotile** asbestos. Two samples of grey pipe fitting insulation were found to contain **10-25% Chrysotile** asbestos. One sample of grey pipe fitting insulation was found to contain **25-50% Chrysotile** asbestos. One sample of grey pipe fitting insulation was found to contain **50-75% Chrysotile** asbestos.

One sample of grey valve fitting insulation was found to contain **10-25% Chrysotile** asbestos. Four samples of grey valve fitting insulation were found to contain **25-50% Chrysotile** asbestos. All other samples of grey valve fitting insulation were found **not** to contain asbestos.

Asbestos containing pipe fitting insulation and valve fitting insulation were sampled and visually referenced in the following locations:

Basement
- Room EB-2

First floor
- Rooms E-19ZZ, E-19, E-37A, E-37C,E-03, E-05T, E-05S, E-05R, E-05Q, E-03P

Second floor
- Rooms E-120ZZ, E-121A, E-122ZZ, E-120B, E-120B2, E-122,E-124,E-121B, E-120, E-121C

Third floor
- Rooms E-311ZZ, E-313ZZ, E-315ZZ

Fourth floor
- Rooms E-416, E-439ZZ, E-435, E-439, E-439A, E-443, E-443A, E-440, E-436, E-424, E-420, E-455, E-459, E-461, E-463, E-412, E-466ZZ, E-478, E-406, E-484

Due to the limitations of the assessment and the numerous renovation activities conducted throughout the Site all pipe-fittings should be verified prior to conducting renovation activities.

Pipe Run Insulation
One sample of pipe run insulation suspected of containing asbestos was collected during the survey. This sample of white pipe run insulation was found to contain **50-75% Amosite** asbestos.

Asbestos containing pipe run insulation was sampled and visually referenced in the following location:

First floor
- Room E-06

Due to the limitations of the assessment, occupied spaces and the numerous renovations conducted throughout the Site, further sampling of pipe run insulation may be required during renovation activities.

Tank Parging
Two samples of tank parging suspected of containing asbestos were collected during a previous survey. One sample of grey tank parging was found to contain **25-50% Chrysotile** asbestos. One sample of grey tank parging was found **not** to contain asbestos

Asbestos containing tank parging was sampled and visually referenced in the following location:

Basement
- Room EB-2

Wall building materials

Drywall and Drywall Joint Compound

One sample of drywall suspected of containing asbestos was collected during a previous survey. This sample of grey drywall was found **not** to contain asbestos.

Twelve samples of drywall joint compound suspected of containing asbestos were collected during the survey and one sample of drywall joint compound suspected of containing asbestos was collected during a previous survey. One sample of beige drywall joint compound was found to contain **1-5% Chrysotile** asbestos. Nine samples of white drywall joint compound were found **not** to contain asbestos. Three samples of beige drywall joint compound were found **not** to contain asbestos with one sample containing <1% Chrysotile asbestos. This sample was resampled and found **not** to contain asbestos, therefore it can be concluded that this drywall joint compound does **not** contain asbestos.

Asbestos containing drywall joint compound was sampled and visually referenced in the following location:

Fourth floor
- Rooms E-431, E-424, E-424A, E-420, E-412, E-412A, E-452, E-452E, E-490, E-466, E-466ZZ, E-466A, E-466B, E-467, E-469, E-471, E-473, E-475, E-479,E-488, E-481, E-483

Due to the limitations of the assessment, occupied spaces and the numerous renovations conducted throughout the Site, further sampling of drywall joint compound may be required during renovation activities.

Plaster (scratch, rough and smooth coat)

Three samples of plaster scratch coat, one sample of rough coat and two samples of plaster smooth coat suspected of containing asbestos were collected during the survey. All samples of grey plaster scratch coat and rough coat and white plaster smooth coat were found **not** to contain asbestos. One sample of white plaster smooth coat was found to contain <1% Chrysotile asbestos. This sample was resampled and was found **not** to contain asbestos, therefore it can be concluded that this plaster smooth coat does **not** contain asbestos.

Recommendations

Based on these conclusions, APSR recommends the following:

Prior to renovation activities, all identified asbestos-containing materials that may become impacted must be abated according to the asbestos abatement procedures as outlined by the

Alberta Asbestos Abatement Manual (July 2009) published by Employment and Immigration, Workplace Health and Safety.

If any asbestos abatement is scheduled to occur within the rooms, it should be conducted by qualified personnel who are trained in working with asbestos. A qualified environmental consultant must also be present during all forms of asbestos abatement to ensure that appropriate work procedures are followed and to conduct appropriate air monitoring during the asbestos abatement process. They also ensure all contamination is contained and asbestos-containing materials are disposed of appropriately.

1. Asbestos-containing tank parging, duct parging, floor leveling compound and pipe run insulation that may be impacted during future renovation activities should be abated following high-risk procedures as outlined in the *Alberta Asbestos Abatement Manual* (July 2009*).*

2. Asbestos-containing drywall joint compound that may be impacted during future renovation activities should be abated following moderate-risk abatement procedures or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).

3. Asbestos-containing pipe fitting insulation that may be impacted during future renovation activities should be abated following a combination of moderate-risk glovebag and low-risk wrap and cut abatement procedures (if the lines are abandoned), or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).

4. Asbestos-containing black gaskets that may be impacted during future renovation activities should be abated following low-risk abatement procedures, or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).

5. Abatement work may have been undertaken since APSR's previous mechanical room survey conducted in this building. This information was added to complete the limited full building survey and these results may not reflect current data.

6. Investigations within wall cavities and above solid ceilings for suspect asbestos-containing materials were not included within the scope of work for this project and should be sampled prior to impacting these materials.

7. Further investigation of all building materials is recommended due to the limitations of the survey, numerous renovations that have taken place throughout the site, inconsistencies with mixing potential asbestos materials and investigation within occupied or enclosed spaces.

APPENDIX I: LABORATORY ANALYSIS

ENVIRO-WORKS INC.
2514 Cameron Ravine Landing NW
Edmonton, Alberta T6M 0L3
Ph: (780) 457-4652
Fax: (780) 473-0767
www.enviro-works.com

CLIENT: APSR
PROJECT: Pys. Ed. East

Bulk (ACM) Identification:
NIOSH 9002 : Issue 2

Date Analyzed	EWL Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
22-Jan-11	53359	1	PARGING MUD ON DUCT	100% Grey fibrous mix	Chrysotile	25-50	NFM
22-Jan-11	53360	2	VINYL FLOOR TILE 12x12	100% Brown tile	ND		NFM
22-Jan-11	53361	3	MASTIC/GLUE	100% Black mastic	ND		Cellulose, NFM
22-Jan-11	53362	4	2X4 CEILING TILE	100% Beige compressed fibrous mat	ND		Cellulose, P, MW, NFM
22-Jan-11	53363	5	PIPE FITTING INSULATION	100% Grey fibrous mix	Chrysotile	25-50	NFM
22-Jan-11	53364	6	VINYL FLOOR TILE 12x12	100% Grey tile	ND		NFM
	53365	7	ACOUSTIC CEMENT CEILING TILE	100% Beige compressed fibrous mat	ND		Cellulose, P, MW, NFM

NFM–Non Fibrous Material
[illegible]
ND–None Detected
GF–Glass Fibre
P–Perlite
MW–Mineral Wool
SF–Synthetic Fibre

Enviro-Works Inc. is a member of the AIHA BAPAT Quality Control Program

1/27/2011 8:08 PMAPSR Bulk Master

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Fax: (780) 473-0767
www.enviro-works.com

Bulk (ACM) Identification:
NIOSH 9002 : Issue 2

CLIENT: APSR
PROJECT: Pys. Ed. East

Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
22-Jan-11	53366	8	PLASTER SCRATCH COAT	100% Grey hard mix	ND		NFM
22-Jan-11	53367	9	FLOOR LEVELING COMPOUND CEMENT-LIKE	100% Grey hard mix	ND		NFM
22-Jan-11	53368	10	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		P, NFM
22-Jan-11	53369	11	FLOOR LEVELING COMPOUND CEMENT-LIKE	100% Grey hard mix	ND		NFM
22-Jan-11	53370	12	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		NFM
25-Jan-11	53371	13	VINYL FLOOR TILE 12x12	100% Beige tile	ND		NFM
25-Jan-11	53372	14	PIPE RUN INSULATION	100% White fibrous mix	Amosite	50-75	NFM

NFM=Non Fibrous Material
V=Vermiculite
ND=None Detected
GF=Glass Fibre
P=Perlite
MW=Mineral Wool
SF=Synthetic Fibre

Enviro-Works Inc. is a member of the AIHA BAPAT Quality Control Program

1/27/2011 8:08 PMAPSR Bulk Master

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Bulk (ACM) Identification:
NIOSH 9002 : Issue 2

CLIENT: APSR
PROJECT: Pys. Ed. East

Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
25-Jan-11	53373	15	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		P, NFM
25-Jan-11	53374	16	MASTIC/GLUE	100% Black mastic	ND		NFM
25-Jan-11	53375	17	FLOOR LEVELING COMPOUND CEMENT-LIKE	100% Black/Grey hard mix	ND		NFM
25-Jan-11	53376	18	ACOUSTIC CEMENT CEILING TILE	100% Beige compressed fibrous mat	ND		Cellulose, P, MW, NFM
25-Jan-11	53377	19	PLASTER SCRATCH COAT	100% Grey hard mix	ND		NFM
25-Jan-11	53378	20	2X4 CEILING TILE	100% Beige compressed fibrous mat	ND		Cellulose, P, MW, NFM
25-Jan-11	53379	21	FLOOR LEVELING COMPOUND CEMENT-LIKE	100% White chalky mix	Chrysotile	1-5	NFM

NFM=Non Fibrous Material
V=Vermiculite
ND=None Detected
GF=Glass Fibre
P=Perlite
MW=Mineral Wool
SF=Synthetic Fibre

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ENVIRO-WORKS INC.
2514 Cameron Ravine Landing NW
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www.enviro-works.com

Bulk (ACM) Identification:
NIOSH 9002 : Issue 2

CLIENT: APSR
PROJECT: Pys. Ed. East

Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
25-Jan-11	53380	22	PLASTER SMOOTH COAT	100% White chalky mix	Chrysotile	<1	NFM
25-Jan-11	53381	23	PLASTER ROUGH COAT	100% Grey hard mix	ND		NFM
25-Jan-11	53382	24	FLOOR LEVELING COMPOUND CEMENT-LIKE	100% Beige hard mix	Chrysotile	<1	NFM
		25	FLOOR LEVELING COMPOUND CEMENT-LIKE	No sample submitted			
25-Jan-11	53383	26	PLASTER SCRATCH COAT	100% Grey hard mix	ND		NFM
25-Jan-11	53384	27	ACOUSTIC CEMENT CEILING TILE	100% Beige compressed fibrous mat	ND		Cellulose, P, MW, NFM
25-Jan-11	53385	28	FLOOR LEVELING COMPOUND CEMENT-LIKE	100% Grey hard mix	ND		NFM

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Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
25-Jan-11	53386	29	MASTIC/GLUE	100% Black mastic	ND		Cellulose, NFM
25-Jan-11	53387	30	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		P, NFM
25-Jan-11	53388	31	DRYWALL JOINT COMPOUND	100% White chalky mix	Chrysotile	<1	NFM
	53389	31a	WHITE FLC(313Z7)	100% Grey/White hard mix	ND		NFM
25-Jan-11	53390	32	ACOUSTIC CEMENT CEILING TILE	100% Beige compressed fibrous mat	ND		Cellulose, P, MW, NFM
25-Jan-11	53391	33	FLOOR LEVELING COMPOUND CEMENT-LIKE	100% White hard mix	Chrysotile	1-5	NFM
25-Jan-11	53392	34	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		P, NFM

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ND=None Detected
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Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
25-Jan-11	53393	35	VINYL FLOOR TILE 12x12	100% Beige tile	ND		NFM
25-Jan-11	53394	36	DRYWALL JOINT COMPOUND	100% Black mastic	ND		Cellulose, NFM
25-Jan-11	53395	36a	E407 BEIGE DWJC	100% White chalky mix	ND		NFM
25-Jan-11	53396	37	FLOOR LEVELING COMPOUND CEMENT-LIKE	100% Black mastic	ND		Cellulose, NFM
		38	FLOOR LEVELING COMPOUND CEMENT-LIKE	No sample submitted			
25-Jan-11	53397	39	MASTIC/GLUE	100% Black mastic	ND		Cellulose, NFM
	53398	40	DRYWALL JOINT COMPOUND	100% White chalky mix	Chrysotile	1-5	NFM

NFM–Non Fibrous Material
V–Vermiculite Mica
ND–None Detected
GF–Glass Fibre
P–Perlite
MW–Mineral Wool
SF–Synthetic Fibre

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Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
25-Jan-11	53399	41	MASTIC ON DUCT	100% Red soft mix	ND		Cellulose, NFM
25-Jan-11	53400	42	CEILING TILE 2X2	100% Beige compressed fibrous mat	ND		MW
25-Jan-11	53401	43	FIREPROOFING INSULATION	100% Grey chalky mix	ND		Cellulose, NFM
25-Jan-11	53402	44	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		P, NFM
25-Jan-11	53403	45	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		P, NFM
25-Jan-11	53404	46	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		P, NFM

Cheri S.

NFM–Non Fibrous Material
V–Vermiculite Mica
ND–None Detected
GF–Glass Fibre
P–Perlite
MW–Mineral Wool
SF–Synthetic Fibre

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APPENDIX II: SITE PHOTOGRAPHS

FIGURE 1: Grey Asbestos Containing Parging Mud on Duct

FIGURE 2: Grey Asbestos Containing Pipe Fitting Insulation

FIGURE 3: White Asbestos Containing Pipe Run Insulation

FIGURE 4: White Asbestos Containing Floor Levelling Compound (cement-like)

FIGURE 5: White Asbestos Containing Floor Levelling Compound (cement-like)

FIGURE 6: Beige Asbestos Containing Drywall Joint Compound

FIGURE 7: White Asbestos Containing Floor Levelling Compound (cement-like)

FIGURE 8: Grey Asbestos Containing Parging Mud on Duct

FIGURE 9: Grey Asbestos Containing Pipe Fitting Mud on 4" Yellow LPC Line

FIGURE 10: Grey Asbestos Containing Parging Mud On Tank

FIGURE 11: Grey Asbestos -Containing Valve Fitting Insulation

FIGURE 12: Grey Asbestos Containing Parging Mud on Duct

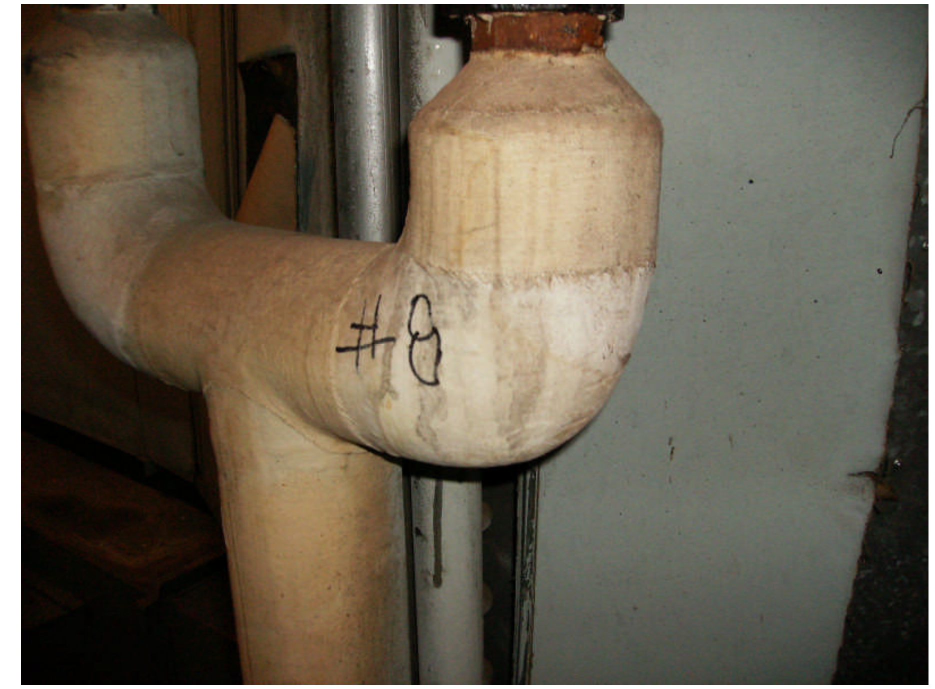


FIGURE 13: Grey Asbestos Containing Pipe Fitting Insulation

FIGURE 14: Grey Asbestos Containing Parging Mud on Duct

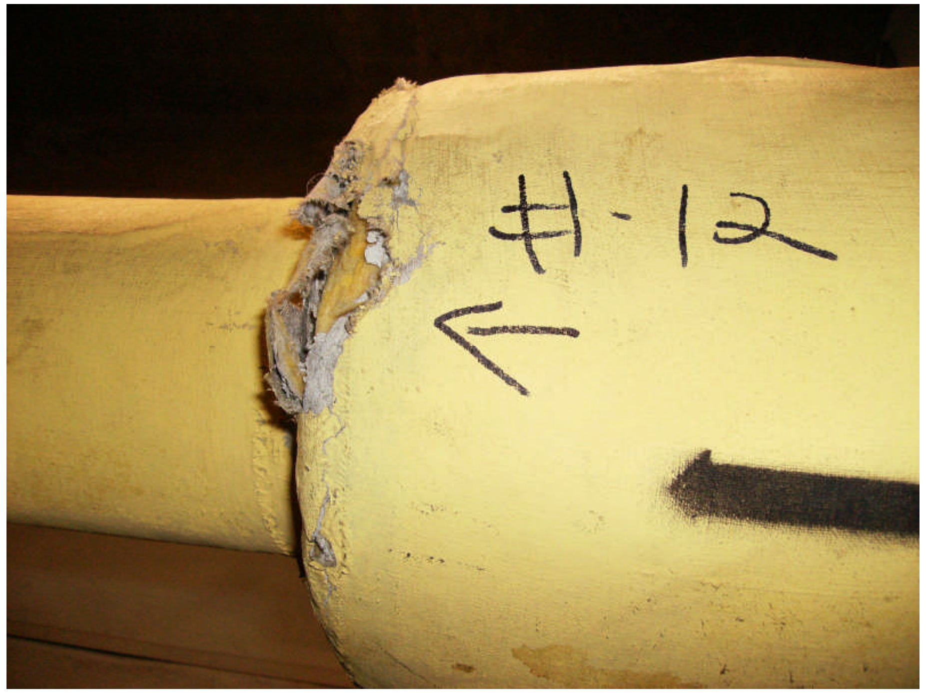


FIGURE 15: Grey Asbestos Containing Valve Fitting Insulation

FIGURE 16: Grey Asbestos Containing Pipe Fitting Insulation

FIGURE 17: Grey Asbestos Containing Pipe Fitting Insulation

FIGURE 18: Grey Asbestos Containing Valve Fitting Insulation

FIGURE 19: Grey Asbestos Containing Parging Mud on Duct

FIGURE 20: Grey Asbestos Containing Parging Mud on Duct

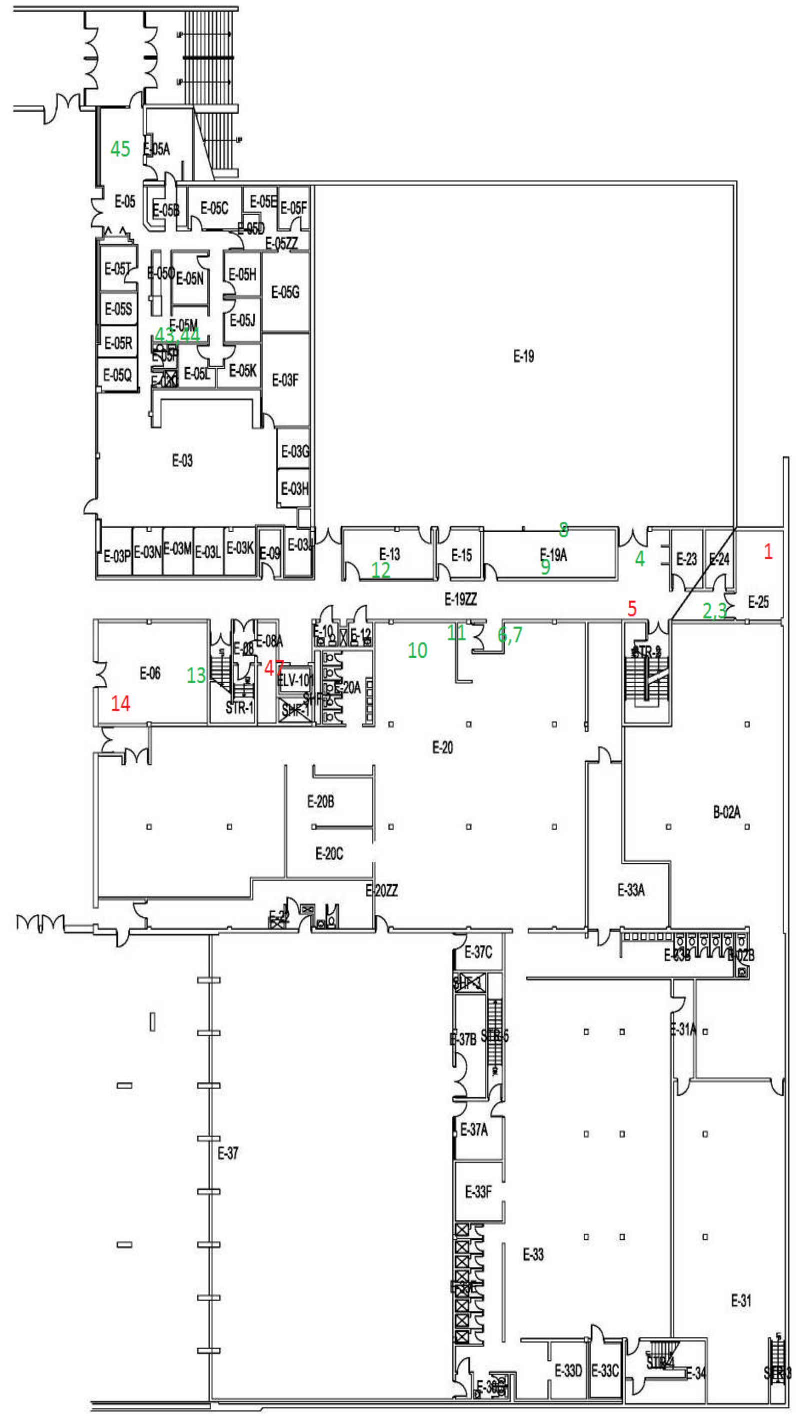
FIGURE 21: Grey Asbestos Containing Pipe Fitting Insulation

FIGURE 22: Black Asbestos Containing Gasket

FIGURE 23: Grey Asbestos Containing Valve Fitting Insulation

FIGURE 24: Grey Asbestos Containing Floor Leveling Compound (Cement) with Black Mastic

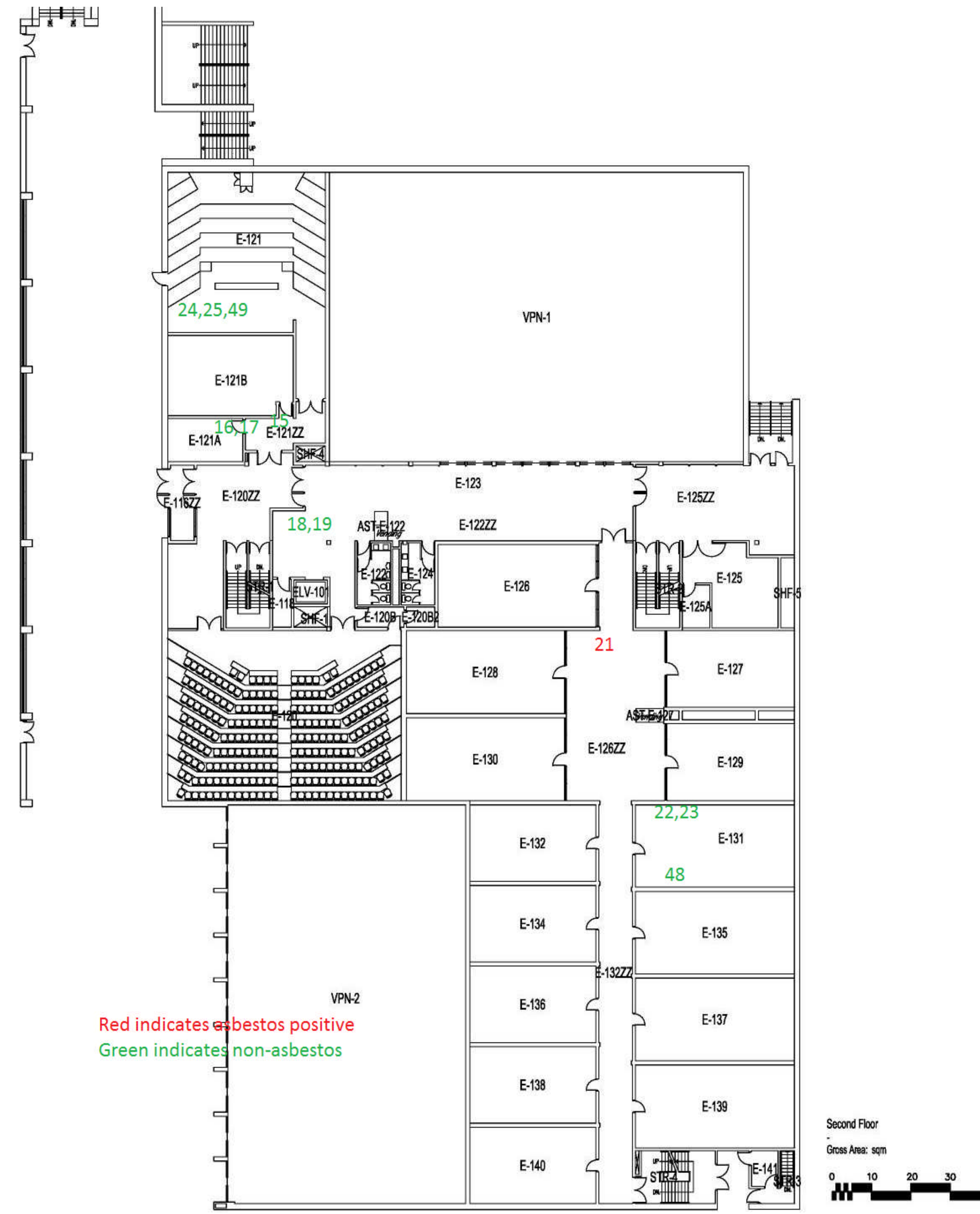
APPENDIX III: SAMPLING LOCATIONS



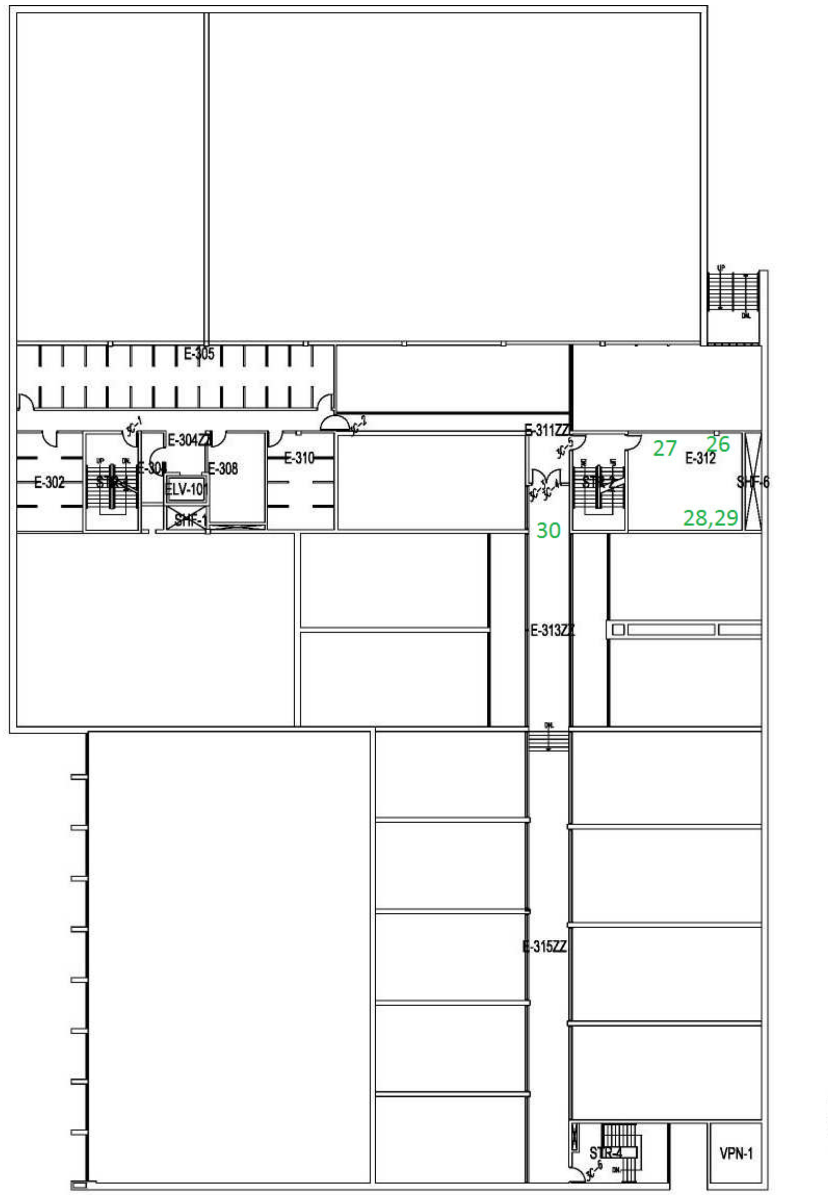
Red indicates asbestos positive
Green indicates non-asbestos

…ning & Infrastructure
…ning Services

First Floor Plan
Van Vliet P.E. Centre-East - 53410



Red indicates asbestos positive
Green indicates non-asbestos



Third Floor Plan
Van Vliet P.E. Centre-East - 53410

Hazardous Materials Details

Van Vliet Physical Education Centre West

University of Alberta Campus

February 2011
Project #: 2010-54 HAZMAT

Results

Asbestos

A total of fifty seven (57) samples of building materials were collected and submitted for analysis for asbestos content. The bulk sample results are provided in Table 1: Asbestos Analytical Results. The laboratory analysis report is attached in Appendix I. Site photographs of the asbestos-containing materials are attached in Appendix II. Sampling locations are attached in Appendix III. **Note: Table 2 contains analytical results from a separate survey report of the mechanical rooms and has been added to complete the limited survey. The previous mechanical room survey data does not reflect any abatement that may have occurred since the mechanical room survey had been conducted.*

Table 1: Asbestos Analytical Results [(1)]

Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
1	Wall	White Plaster (smooth coat)	West Side of W-023	None Detected	NA
2	Wall	Grey Plaster (rough coat)	West Side of W-023	None Detected	NA
3	**Mechanical**	**Grey Pipe Fitting Insulation**	**North Side of W-018**	**Chrysotile**	**> 75%**
4	Flooring	Black Mastic/Glue	North Side of W-071	None Detected	NA
5	Mechanical	Brown Pipe Run Insulation	North Side of W-063	None Detected	NA
6	**Wall**	**White Drywall Joint Compound**	**Centre of W-055**	**Chrysotile**	**1 - 5%**
7	Mechanical	Black Felt Paper on Duct w/ Mastic	Centre of W-047	None Detected	NA
8	Flooring	White Vinyl Floor Tile (9"x9") w/ Black Streaks	South Side of W-037	None Detected	NA

Note:
1. Bold values indicate positive for asbestos-containing

Table 1: Asbestos Analytical Results [1]

Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
9	Wall	White Plaster (smooth coat)	North Side of W-095ZZ	None Detected	NA
10	Wall	Grey Plaster (rough coat)	North Side of W-095ZZ	None Detected	NA
11	**Mechanical**	**Grey Pipe Run Insulation**	**East Side of W-095A**	**Amosite**	**50 - 75%**
12	Roofing	White Drywall Joint Compound	North Side of W-014	None Detected	NA
13	**Mechanical**	**Grey Pipe Fitting Insulation**	**Centre of W-010J**	**Chrysotile**	**25 - 50%**
14	**Ceiling**	**Grey Ceiling Tile (2×4) W/Small Pinholes and Large Fissures and Red Backing**	**Centre of W-003**	**Amosite**	**25 - 50%**
15	Flooring	Grey Vinyl Floor Tile (12"x12") w/ Black Streaks	North Side of W-003	None Detected	NA
16	Ceiling	White Stipple Coat	West Side of W-001ZZ	None Detected	NA
17	**Mechanical**	**White Pipe Run Insulation**	**North Side of W-013**	**Amosite**	**50 - 75%**
18	Flooring	Grey Floor Levelling Compound (cement-like)	South Side of W-083	None Detected	NA
19	Wall	White Drywall Joint Compound	South Side of W-083	None Detected	NA

Note:

1. Bold values indicate positive for asbestos-containing

Table 1: Asbestos Analytical Results [1]

Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
20	Ceiling	Brown Fireproofing/ Insulation	Centre of W-084ZZ	None Detected	NA
21	Wall	White Drywall Joint Compound	West Side of W-084ZZ	None Detected	NA
22	Flooring	Grey Floor Levelling Compound (cement-like)	West Side of W-084ZZ	None Detected	NA
23	Flooring	Beige Vinyl Floor Tile (12"x12") w/ Brown Streaks	West Side of W-084ZZ	None Detected	NA
24	Flooring	Grey Vinyl Floor Tile (12"x12")	West Side of W-084ZZ	None Detected	NA
25	Ceiling	Grey Ceiling tile (2×4) w/ Large and Small Pinholes and Large Fissures	West Side of W-084ZZ	None Detected	NA
26	Wall	White Drywall Joint Compound	East Side of W1-035ZZ	None Detected	NA
27	**Mechanical**	**Grey Pipe Fitting Insulation**	**East Side of W1-059**	**Chrysotile**	**> 75%**
28	Flooring	Grey Vinyl Floor Tile (9"x9") w/ Black Streaks	SE Corner of W1-059	None Detected	NA
29	Flooring	Red Vinyl Floor Tile (9"x9")	NW Corner of W1-053	None Detected	NA
30	Flooring	Black Mastic/Glue	NW Corner of W1-053	None Detected	NA

Note:

1. Bold values indicate positive for asbestos-containing

Table 1: Asbestos Analytical Results [1]					
Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
31	Flooring	Beige Vinyl Floor Tile (12"x12") w/ Brown Streaks	North Side of W1-035ZZ	None Detected	NA
32	Flooring	White Floor Levelling Compound (cement-like)	West Side of W1-035ZZ	None Detected	NA
33	Wall	Grey Plaster (scratch coat)	East Side of W1-087	None Detected	NA
34	Flooring	Brown Vinyl Floor Tile (9"x9")	East Side of W1-087	None Detected	NA
35	Flooring	Black Mastic/Glue	South Side of W1-087	None Detected	NA
36	Flooring	Brown Vinyl Floor Tile (9"x9") w/ Beige Streaks and Paperbacking	SE Corner of W1-039	None Detected	NA
37	Ceiling	White Plaster (smooth coat)	East Side of W1-063A	None Detected	NA
38	Ceiling	Grey Plaster (rough coat)	East Side of W1-063A	None Detected	NA
39	Flooring	White Vinyl Floor Tile (9"x9") w/ Black Streaks	South Side of W1-088ZZ	None Detected	NA
40	Flooring	Grey Vinyl Floor Tile (9"x9") w/ White Streaks	South Side of W1-088ZZ	None Detected	NA
41	Flooring	Black Mastic/Glue	SE Corner of W1-034	None Detected	NA
42	Wall	White Drywall	North Side of W1-034C	None Detected	NA

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Table 1: Asbestos Analytical Results [1]					
Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
43	Flooring	Green Vinyl Floor Tile (9"x9") w/ White Streaks	NE Corner of W2-063ZZ	None Detected	NA
44	Flooring	Beige Vinyl Floor Tile (9"x9") w/ Brown Streaks	NE Corner of W2-063ZZ	None Detected	NA
45	**Wall**	**White Drywall Joint Compound**	**East Side of W2-063ZZ**	**Chrysotile**	**1 - 5%**
46	Wall	White Plaster (smooth coat)	East Side of W2-063ZZ	None Detected	NA
47	Wall	Grey Plaster (rough coat)	East Side of W2-063ZZ	None Detected	NA
48	Mechanical	Brown Pipe run insulatoin	NE Corner of W2-068ZZ	None Detected	NA
49	Flooring	Black Mastic/Glue	South Side of W2-063ZZ	None Detected	NA
50	**Wall**	**White Drywall Joint Compound**	**South Side of W-078D**	**Chrysotile**	**1 - 5%**
51	Wall	White Drywall Joint Compound	South Side of W2-072	None Detected	NA
52	**Wall**	**White Drywall Joint Compound**	**South Side of W-083**	**Chrysotile**	**1 - 5%**
53	Wall	White Drywall Joint Compound	South Side of W2-072	None Detected	NA

Note:

1. Bold values indicate positive for asbestos-containing

Table 1: Asbestos Analytical Results [1]					
Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
54	Flooring	White Floor Levelling Compound (cement-like)	North Side of W1-035ZZ	None Detected	NA
55	Flooring	Grey Paper Backing	NE Corner of W1-039	None Detected	NA
56	Flooring	White Floor Levelling Compound (cement-like)	NE Corner of W1-039	None Detected	NA
57	Ceiling	White Stipple Coat	W-001ZZ	None Detected	NA

Note:
1. Bold values indicate positive for asbestos-containing

Table 2: Previous Mechanical Room Survey Asbestos Analytical Results [1]					
Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
1	Mechanical	Grey Pipe Fitting Insulation	SE Corner of W-4	None Detected	NA
2	Mechanical	Grey Pipe Fitting Insulation	SE Corner of W-4	None Detected	NA
3	Mechanical	Grey Pipe Fitting Insulation	East side of W-4	None Detected	NA
4	Mechanical	Grey Valve Fitting Insulation	South side of W-4A	None Detected	NA
5	Mechanical	Grey Pipe Fitting Insulation	Centre of W-4A	None Detected	NA
6	Mechanical	Grey Pipe Fitting Insulation	South Side of W-4A	None Detected	NA

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Table 2: Previous Mechanical Room Survey Asbestos Analytical Results [1]					
Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
7	Mechanical	Grey Valve Fitting Insulation	North Side of W-4C	None Detected	NA
8	Mechanical	Grey Valve Fitting Insulation	NE Corner of W-4C	None Detected	NA
9	Mechanical	Grey Pipe Fitting Insulation	NE Corner of W-4C	None Detected	NA
10	Mechanical	Grey Pipe Fitting Insulation	North Side of W-4C	None Detected	NA
11	Mechanical	Grey Pipe Fitting Insulation	North Side of W-4C	None Detected	NA
12	**Mechanical**	**Grey Parging Mud on Duct**	**North Side of W2-66**	**Chrysotile**	**10 - 25%**
13	Mechanical	Black Mastic on Duct	North Side of W2-66	None Detected	NA
14	Mechanical	Grey Pipe Fitting Insulation	Centre of W2-66	None Detected	NA
15	**Mechanical**	**Grey Pipe Fitting Insulation**	**East Side of W2-66 east side of room**	**Chrysotile**	**25 - 50%**
16	**Mechanical**	**Grey Valve Fitting Insulation**	**Centre of W2-66**	**Chrysotile**	**1 - 5%**
17	**Mechanical**	**Grey Parging Mud on Duct**	**South Side of W2-66**	**Chrysotile**	**25 - 50%**

Note:
1. Bold values indicate positive for asbestos-containing

Table 2: Previous Mechanical Room Survey Asbestos Analytical Results[1]					
Sample	**Type of Material Sampled**	**Description of Material Sampled**	**Location of Sample**	**Asbestos Type**	**Asbestos Content**
18	**Flooring**	**Black Mastic**	**Centre of W2-66**	**Chrysotile**	**1 - 5%**
19	**Mechanical**	**Grey Exhaust Parging**	**Centre of W2-66A**	**Chrysotile**	**50 - 75%**
20	**Mechanical**	**Grey Pipe Fitting Insulation**	**NW Corner of W2-66A**	**Chrysotile**	**25 - 50%**
21	**Mechanical**	**Black Gasket**	**East side of W-88C**	**Chrysotile**	**75 - 100%**
22	**Miscellaneous**	**Grey Debris**	**East side of W-88C**	**Chrysotile**	**10 - 25%**

Note:

1. Bold values indicate positive for asbestos-containing

Discussion and Conclusions

Asbestos

Ceiling building materials

Ceiling tiles

Two samples of (2x4) ceiling tiles suspected of containing asbestos were collected during the survey. One sample of grey (2x4) ceiling tiles with small pinholes and large fissures and red backing was found to contain **25-50% Chrysotile** asbestos. One sample of grey (2x4) ceiling tiles with large and small pinholes and large fissures was found **not** to contain asbestos.

Asbestos containing ceiling tiles (2x4) was sampled and visually referenced in the following location:

First floor

- Room W-003

Due to the limitations of the assessment, occupied spaces and the numerous renovations conducted throughout the Site, further investigation of ceiling tiles is recommended.

Fireproofing/insulation

One sample of fireproofing/insulation suspected of containing asbestos was collected during the survey. This sample of grey fireproofing/insulation was found **not** to contain asbestos.

Plaster (rough and smooth coat)

One sample of plaster rough coat and one sample of plaster smooth coat suspected of containing asbestos were collected during the survey. Both samples of grey plaster rough coat and white plaster smooth coat were found **not** to contain asbestos.

Stipple Coat

Two samples of stipple coat suspected of containing asbestos were collected during the survey. Both samples of white stipple coat were found **not** to contain asbestos.

Flooring building materials

Floor Levelling Compound

Five samples of floor levelling compound suspected of containing asbestos were collected during the survey. Three samples of white floor levelling compound and two samples of grey floor levelling compound were found **not** to contain asbestos.

Mastic/Glue

Five samples of mastic/glue suspected of containing asbestos were collected during the survey and one sample was collected during a previous survey. One sample of black floor mastic (red underneath) was found to contain **1-5% Chrysotile** asbestos. Five samples of black mastic/glue were found **not** to contain asbestos.

Asbestos containing floor mastic/glue was sampled and visually referenced in the following location:

Second floor

- Room W2-66

Paperbacking
One sample of paperbacking suspected of containing asbestos was collected during the survey. This sample of grey paperbacking was found **not** to contain asbestos.

Vinyl Floor Tiles (9x9)
Nine samples of vinyl floor tiles (9x9) suspected of containing asbestos were collected during the survey. All the following vinyl floor tiles (9x9) were found **not** to contain asbestos:

- white vinyl floor tiles (9x9) with black streaks
- grey vinyl floor tiles (9x9) with black streaks
- red vinyl floor tiles (9x9)
- brown vinyl floor tiles (9x9)
- brown vinyl floor tiles (9x9) with beige streaks
- white vinyl floor tiles (9x9) with black streaks
- grey vinyl floor tiles (9x9) with white streaks
- green vinyl floor tiles (9x9) with white streaks
- beige vinyl floor tiles (9x9) with brown streaks

Vinyl Floor Tiles (12x12)
Four samples of vinyl floor tiles (12x12) suspected of containing asbestos were collected during the survey. One sample of grey vinyl floor tiles (12x12) with black streaks, one sample of beige vinyl floor tiles (12x12) with brown streaks, one sample of grey vinyl floor tiles (12x12) and one sample of beige vinyl floor tiles (12x12) with brown streaks were found **not** to contain asbestos.

Mechanical building materials

Duct and Exhaust Parging
Two samples of duct parging and one sample of exhaust parging suspected of containing asbestos were collected during a previous survey. One sample of grey duct parging was found to contain **25-50% Chrysotile** asbestos and one sample of grey duct parging was found to contain **10-25% Chrysotile** asbestos. One sample of grey exhaust parging was found to contain **50-75% Chrysotile** asbestos.

Asbestos containing duct and exhaust parging were sampled and visually referenced in the following locations:

Second floor

- Rooms W2-66, W-266A

Duct Mastic
One sample of duct mastic suspected of containing asbestos was collected during the survey and one sample of duct mastic suspected of containing asbestos was collected during a previous survey. Both samples of red duct mastic were found **not** to contain asbestos.

Felt Paper
One sample of felt paper suspected of containing asbestos was collected the survey. This sample of black felt paper with black mastic was found **not** to contain asbestos.

Gasket
One black gasket sample suspected of containing asbestos was collected during a previous survey. This sample of black gasket was found to contain **75-100% Chrysotile** asbestos.

Asbestos containing gasket was sampled and visually referenced in the following location:

First floor

- Room W-88C

Pipe Fitting Insulation and Valve Fitting Insulation
Two samples of pipe fitting insulation suspected of containing asbestos was collected during the survey and eleven samples of pipe fitting insulation and four sample of pipe valve insulation suspected of containing asbestos were collected during a previous survey.

Two samples of grey pipe fitting insulation were found to contain **>75% Chrysotile** asbestos. Three sample of grey pipe fitting insulation were found to contain **25-50% Chrysotile** asbestos. One sample of grey pipe valve insulation was found to contain **1-5% Chrysotile** asbestos.

All other pipe fitting insulation samples collected were found **not** to contain asbestos

Asbestos containing pipe fitting insulation and valve fitting insulation were sampled and visually referenced in the following locations:

First floor

- Rooms W-018, W-039ZZ, W-071, W-067, W-063, W-061A, W-061, W-064, W-057, W-057A, W-059, W-055, W-051, W-048, W-046, W-047, W-045, W-036, W-033, W-037, W-037A, W-030, W1-045, W-010J, W-014ZZ, W-008, W-006, W-090ZZ, W-013, W-007, W-095, W-087, W-092ZZ, W-098, W-098A3, W-098B, W-092, W-090, W-082A, W-082A1, W-078, W-078B, W-080, W-080A, W-080L, W-078ZZ, W-082ZZ, W-074, W-072, W-090AA, W-072A, W-076, W1-046ZZ

Second floor

- Rooms W1-035ZZ, W1-059, W1-058, W1-057, W1-056, W1-055, W1-054, W1-053, W1-051, W1-049, W1-047, W1-046, W1-066, W1-067A, W1-075, W1-098C, W1-035, W1-062,

Third floor

- Rooms W2-063ZZ, W2-068ZZ, W2-060, W2-060A, W2-072, W2-66

Due to the limitations of the assessment and the numerous renovation activities conducted throughout the Site all pipe-fittings should be verified prior to conducting renovation activities.

Pipe Run Insulation
Four samples of pipe run insulation suspected of containing asbestos were collected during the survey. One sample of white pipe run insulation and one sample of grey pipe run insulation were found to contain **50-75% Amosite** asbestos. Two samples of brown pipe run insulation were found **not** to contain asbestos.

Asbestos containing pipe run insulation was sampled and visually referenced in the following locations:

First floor
- Rooms W-095A, W-010J, W-014ZZ, W-008, W-006, W-090ZZ, W-013, W-007, W-079, W-095, W-087, W-092ZZ, W-098A, W-094ZZ, W-098A3, W-098A1, W-098A2, W-092, W-090, W-082A, W-082A1, W-078, W-078B, W-080, W-080A, W-078ZZ, W-082ZZ, W-074, W-072, W-090AA, W-072A, W-076

Second floor
- Rooms W1-067A, W1-075, W1-035, W1-046ZZ

Due to the limitations of the assessment, occupied spaces and the numerous renovations conducted throughout the Site, further sampling of pipe run insulation may be required during renovation activities.

Miscellaneous
Debris
One sample of grey floor debris suspected of containing asbestos was collected during a previous survey. This sample of grey debris was found to contain **10-25% Chrysotile** asbestos.

Asbestos containing debris was sampled and visually referenced in the following location:

First floor
- Room W-88C

Wall building materials
Drywall Joint Compound
Nine samples of drywall joint compound suspected of containing asbestos were collected during the survey. Three samples of white drywall joint compound were found to contain **1-5% Chrysotile** asbestos. Two samples of white drywall joint compound were found to contain <1% Chrysotile asbestos. Both samples were resampled and one was found to contain **1-5% Chrysotile** asbestos and one sample was found **not** to contain asbestos therefore it can be concluded that this drywall joint compound does **not** contain asbestos. Six samples of white drywall joint compound were found **not** to contain asbestos.

Asbestos containing drywall joint compound was sampled and visually referenced in the following locations:

First floor
- Rooms W-055, W-033, W-037, W-037A, W-079, W-083, W-082A, W-078C, W-078D

Second floor
- Rooms W2-063ZZ, W2-068ZZ, W2-060, W2-060A, W2-063, W2-067

Due to the limitations of the assessment, occupied spaces and the numerous renovations conducted throughout the Site, further sampling of drywall joint compound may be required during renovation activities.

Plaster (scratch, rough and smooth coat)
One sample of plaster scratch coat, three samples of rough coat and three samples of plaster smooth coat suspected of containing asbestos were collected during the survey. All samples of grey plaster scratch coat and rough coat and white plaster smooth coat were found **not** to contain asbestos.

Recommendations

Based on these conclusions, APSR recommends the following:

Prior to renovation activities, all identified asbestos-containing materials that may become impacted must be abated according to the asbestos abatement procedures as outlined by the *Alberta Asbestos Abatement Manual* (July 2009) published by Employment and Immigration, Workplace Health and Safety.

If any asbestos abatement is scheduled to occur within the rooms, it should be conducted by qualified personnel who are trained in working with asbestos. A qualified environmental consultant must also be present during all forms of asbestos abatement to ensure that appropriate work procedures are followed and to conduct appropriate air monitoring during the asbestos abatement process. They also ensure all contamination is contained and asbestos-containing materials are disposed of appropriately.

1. Asbestos-containing duct parging, floor leveling compound and pipe run insulation that may be impacted during future renovation activities should be abated following high-risk procedures as outlined in the *Alberta Asbestos Abatement Manual* (July 2009*).*

2. Asbestos-containing ceiling tiles and drywall joint compound that may be impacted during future renovation activities should be abated following moderate-risk abatement procedures or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).

3. Asbestos-containing pipe fitting insulation that may be impacted during future renovation activities should be abated following a combination of moderate-risk glovebag and low-risk wrap and cut abatement procedures (if the lines are abandoned), or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).

4. Asbestos-containing black gaskets and floor mastic that may be impacted during future renovation activities should be abated following low-risk abatement procedures, or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).

5. Abatement work may have been undertaken since APSR's previous mechanical room survey conducted in this building. This information was added to complete the limited full building survey and these results may not reflect current data.

6. Investigations within wall cavities and above solid ceilings for suspect asbestos-containing materials were not included within the scope of work for this project and should be sampled prior to impacting these materials.

7. Further investigation of all building materials is recommended due to the limitations of the survey, numerous renovations that have taken place throughout the site, inconsistencies with mixing potential asbestos materials and investigation within occupied or enclosed spaces.

APPENDIX I: LABORATORY ANALYSIS

ENVIRO-WORKS INC.
2514 Cameron Ravine Landing NW
Edmonton, Alberta T6M 0L3
Ph: (780) 457-4652
Fax: (780) 473-0767
www.enviro-works.com

Bulk (ACM) Identification:
NIOSH 9002 : Issue 2

CLIENT: APSR
PROJECT: Pys. Ed. West

Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
30-Jan-11	53745	1	PLASTER SMOOTH COAT	100% White hard mix	ND		NFM
30-Jan-11	53746	2	PLASTER ROUGH COAT	100% Grey hard mix	ND		NFM
30-Jan-11	53747	3	PIPE FITTING INSULATION	100% Grey fibrous mix	Chrysotile	>75	NFM
30-Jan-11	53748	4	MASTIC/GLUE	100% Black soft mass	ND		Cellulose, NFM
30-Jan-11	53749	5	PIPE RUN INSULATION	100% Grey fibrous mix	ND		Cellulose
30-Jan-11	53750	6	DRYWALL JOINT COMPOUND	100% White chalky mix	Chrysotile	1-5	NFM
30-Jan-11	53751	7	FELT PAPER ON DUCT	100% Black thin fibrous sheet	ND		Cellulose
30-Jan-11	53752	8	VINYL FLOOR TILE 9x9	100% White tile	ND		NFM

NFM-Non Fibrous Material
V-Vermiculite Mica
ND-None Detected
GF-Glass Fibre
P-Perlite
MW-Mineral Wool
SF-Synthetic Fibre

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30-Jan-11	53753	9	PLASTER SMOOTH COAT	100% White hard mix	ND		NFM
30-Jan-11	53754	10	PLASTER ROUGH COAT	100% Grey hard mix	ND		NFM
30-Jan-11	53755	11	PIPE RUN INSULATION	100% Grey fibrous mix	Amosite	50-75	NFM
30-Jan-11	53756	12	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		P, NFM
30-Jan-11	53757	13	PIPE FITTING INSULATION	100% Grey fibrous mix	Chrysotile	25-50	NFM
30-Jan-11	53758	14	CEILING TILE 2X4	100% Beige compressed fibrous mat	Amosite	25-50	MW, NFM
1-Feb-11	53759	15	VINYL FLOOR TILE 12X12	100% Grey tile	ND		NFM
1-Feb-11	53760	16	STIPPLE COAT	100% White chalky mix	ND		Cellulose, NFM

NFM-Non Fibrous Material
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Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
1-Feb-11	53761	17	PIPE RUN INSULATION	100% Grey fibrous mix	Amosite	50-75	NFM
1-Feb-11	53762	18	FLOOR LEVELING COMPOUND CEMENT LIKE	100% Grey hard mix	ND		NFM
1-Feb-11	53763	19	DRYWALL JOINT COMPOUND	100% White chalky mix	Chrysotile	<1	NFM
1-Feb-11	53764	20	FIREPROOFING INSULATION	100% Grey fibrous mix	ND		Cellulose, NFM
1-Feb-11	53765	21	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		P, NFM
1-Feb-11	53766	22	FLOOR LEVELING COMPOUND CEMENT LIKE	100% Grey cementitious mix	ND		NFM
1-Feb-11	53767	23	VINYL FLOOR TILE 12X12	100% White tile	ND		NFM
1-Feb-11	53768	24	VINYL FLOOR TILE 12X12	100% White tile	ND		NFM

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Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
1-Feb-11	53769	25	CEILING TILE 2X4	100% Beige compressed fibrous mat	ND		Cellulose, P, MW, NFM
1-Feb-11	53770	26	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		NFM
1-Feb-11	53771	27	PIPE FITTING INSULATION	100% Grey fibrous mix	Chrysotile	>75	NFM
1-Feb-11	53772	28	VINYL FLOOR TILE 9x9	100% Grey tile	ND		NFM
1-Feb-11	53773	29	VINYL FLOOR TILE 9x9	100% Red tile	ND		NFM
1-Feb-11	53774	30	MASTIC/GLUE	100% Black tarred soft mass	ND		NFM
1-Feb-11	53775	31	VINYL FLOOR TILE 12X12	100% Beige tile	ND		NFM
1-Feb-11	53776	32	FLOOR LEVELING COMPOUND CEMENT LIKE	100% White hard mix	ND		NFM

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Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
1-Feb-11	53777	33	PLASTER SCRATCH COAT	100% White hard mix	ND		NFM
1-Feb-11	53778	34	VINYL FLOOR TILE 9x9	100% Brown tile	ND		NFM
1-Feb-11	53779	35	MASTIC/GLUE	100% Black tarred soft mass	ND		Cellulose, NFM
1-Feb-11	53780	36	VINYL FLOOR TILE 9x9	90% Brown vinyl sheet 10% Black tarred fibrous backing	ND ND		Cellulose, NFM Cellulose
1-Feb-11	53781	37	PLASTER SMOOTH COAT	100% White hard mix	ND		NFM
1-Feb-11	53782	38	PLASTER ROUGH COAT	100% White hard mix	ND		NFM
1-Feb-11	53783	39	VINYL FLOOR TILE 9x9	100% White tile	ND		NFM
1-Feb-11	53784	40	VINYL FLOOR TILE 9x9	100% Dark Grey tile	ND		NFM

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Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
1-Feb-11	53785	41	MASTIC/GLUE	100% Black soft mass	ND		Cellulose, NFM
1-Feb-11	53786	42	DRYWALL	100% White chalky mix	ND		NFM
1-Feb-11	53787	43	VINYL FLOOR TILE 9x9	100% Green tile	ND		NFM
1-Feb-11	53788	44	VINYL FLOOR TILE 9x9	100% Beige tile	ND		NFM
5-Feb-11	53789	45	DRYWALL JOINT COMPOUND	100% White chalky mix	Chrysotile	1-5	NFM
5-Feb-11	53790	46	PLASTER SMOOTH COAT	100% White hard mix	ND		NFM
5-Feb-11	53791	47	PLASTER ROUGH COAT	100% Grey hard mix	ND		NFM

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Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
5-Feb-11	53792	48	PIPE RUN INSULATION	100% Brown thin fibrous sheet	ND		Cellulose
5-Feb-11	53793	49	MASTIC/GLUE	100% Brown/Grey hard mix	ND		NFM
5-Feb-11	53794	50	DRYWALL JOINT COMPOUND	100% White chalky mix	Chrysotile	1-5	NFM
5-Feb-11	53795	51	DRYWALL JOINT COMPOUND	100% White chalky mix	Chrysotile	<1	NFM
17-Feb-11	54460	52	DRYWALL JOINT COMPOUND	100% White chalky mix	Chrysotile	1-5	NFM
17-Feb-11	54461	53	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		NFM
17-Feb-11	54462	54	FLOOR LEVELING COMPOUND CEMENT LIKE	100% Grey hard mix	ND		Cellulose, NFM
17-Feb-11	54463	55	PAPER BACKING	100% Grey fibrous sheet	ND		Cellulose, NFM

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Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
17-Feb-11	54464	56	FLOOR LEVELING COMPOUND CEMENT LIKE	100% Grey hard mix	ND		Cellulose, NFM
17-Feb-11	54465	57	STIPPLE COAT	100% White chalky mix	ND		Cellulose, NFM

Cherie Laplante, B.Sc.
Lab Analyst

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SF–Synthetic Fibre

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APPENDIX II: SITE PHOTOGRAPHS

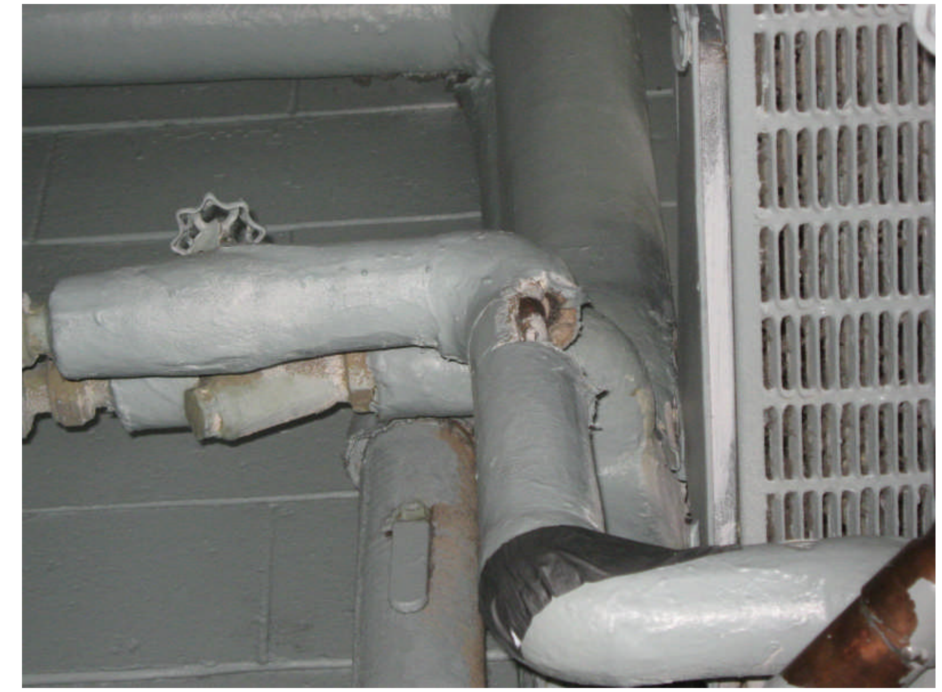


FIGURE 1: Grey Asbestos Containing Pipe Fitting Insulation

FIGURE 2: White Asbestos Containing Drywall Joint Compound

FIGURE 3: Grey Asbestos Containing Pipe Run Insulation

FIGURE 4: Grey Asbestos Containing Pipe Fitting Insulation

FIGURE 5: Grey Asbestos Containing Ceiling Tile (2x4)

FIGURE 6: Grey Asbestos Containing Pipe Run Insulation

FIGURE 7: Grey Asbestos Containing Pipe Fitting Insulation

FIGURE 8: White Asbestos Containing Drywall Joint Compound

FIGURE 9: White Asbestos Containing Drywall Joint Compound

FIGURE 10: White Asbestos Containing Drywall Joint Compound

FIGURE 11: Grey Asbestos Containing Parging Mud on Duct

FIGURE 12: Grey Asbestos Containing Pipe Fitting Insulation

FIGURE 13: Grey Asbestos Containing Pipe Valve Insulation

FIGURE 14: Grey Asbestos Containing Parging Mud on Duct

FIGURE 15: Black Asbestos Containing Floor Mastic

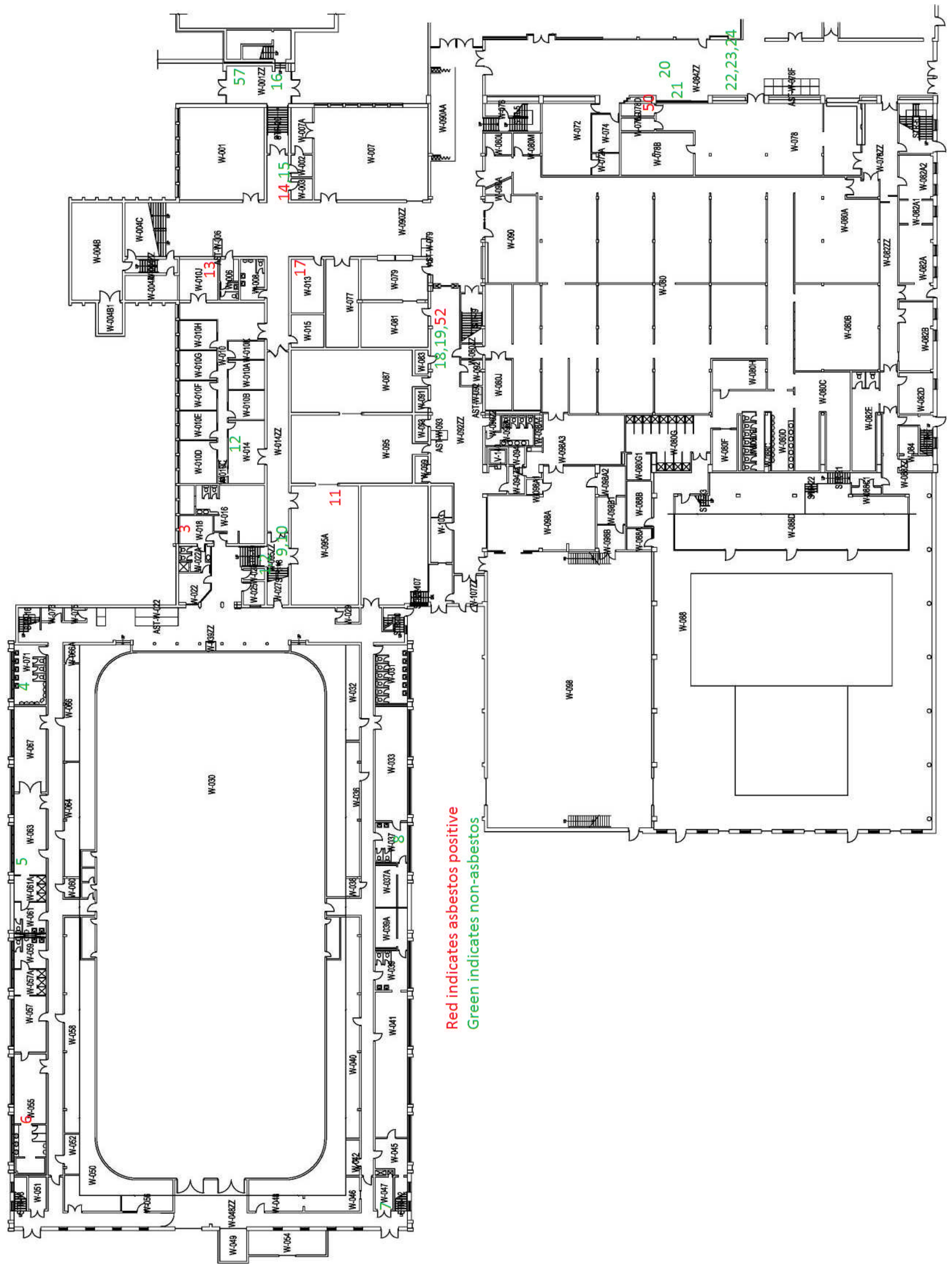
FIGURE 16: Grey Asbestos Containing Exhaust Parging

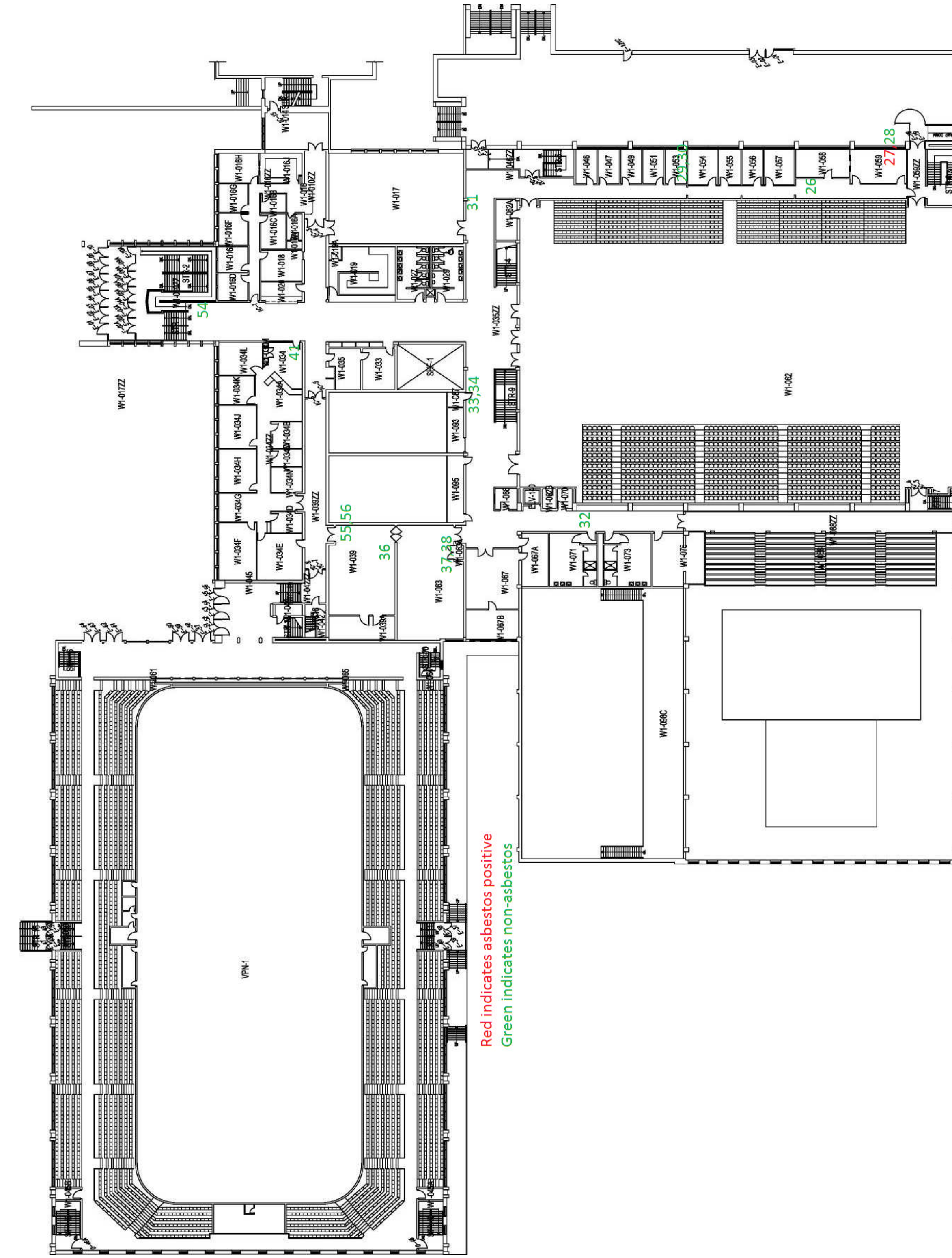
FIGURE 17: Grey Asbestos Containing Pipe Fitting Insulation

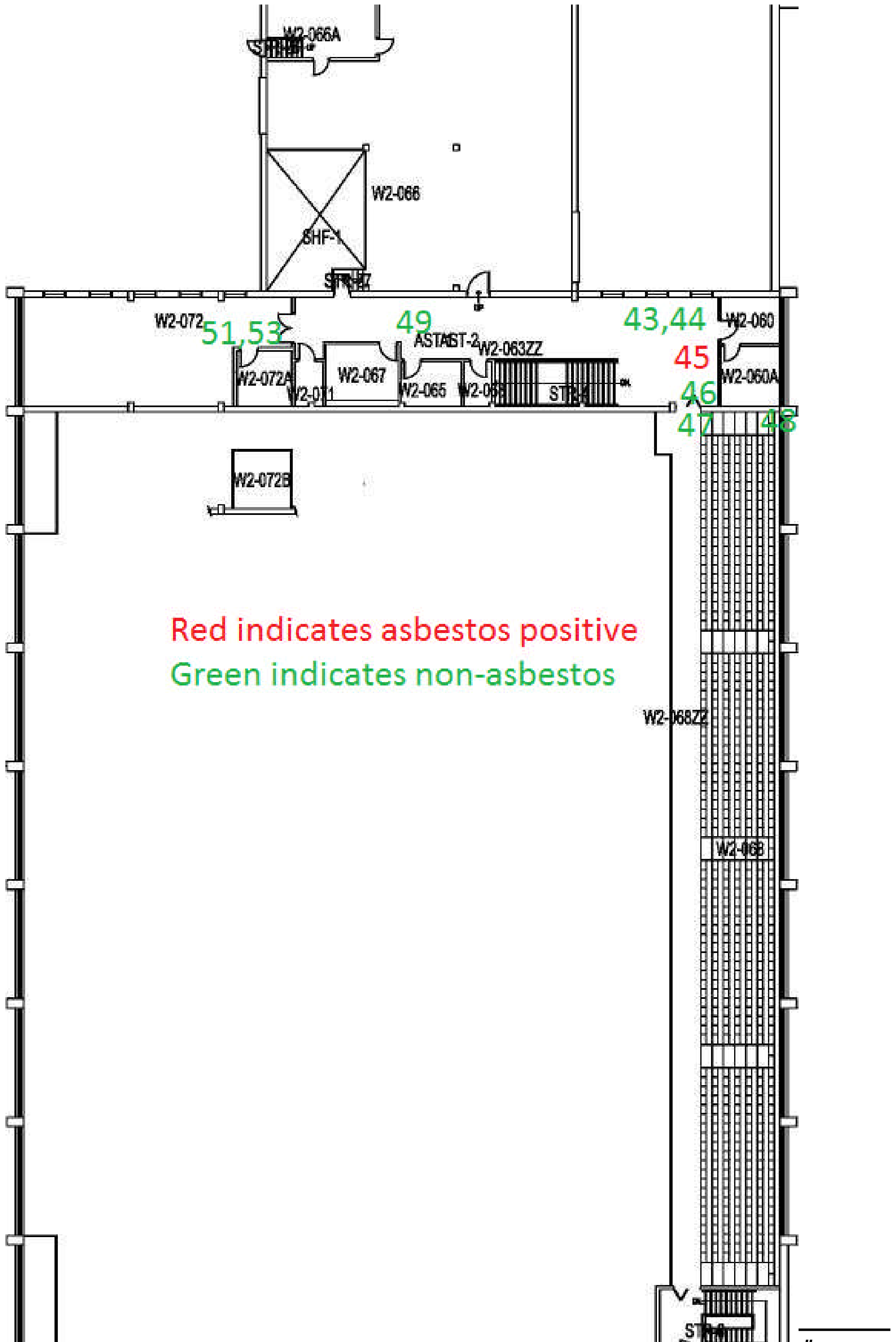
FIGURE 18: Black Asbestos Containing Gasket

FIGURE 19: Grey Asbestos Containing Debris

APPENDIX III: SAMPLING LOCATIONS


Red indicates asbestos positive
Green indicates non-asbestos


Red indicates asbestos positive
Green indicates non-asbestos



Hazardous Materials Details

<u>Universiade Pavilion</u>

University of Alberta Campus

February 2011
Project #: 2010-54 HAZMAT

Results

Asbestos

A total of twenty five (25) samples of building materials were collected and submitted for analysis for asbestos content. The bulk sample results are provided in Table 1: Asbestos Analytical Results. The laboratory analysis report is attached in Appendix I. Site photographs of the asbestos-containing materials are attached in Appendix II. Sampling locations are attached in Appendix III. **Note: Table 2 contains analytical results from a separate survey report of the mechanical rooms and has been added to complete the limited survey. The previous mechanical room survey data does not reflect any abatement that may have occurred since the mechanical room survey had been conducted.*

Table 1: Asbestos Analytical Results (1)

Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
1	Ceiling	Grey Fireproofing/insulation	East Side of P-131ZZ	None Detected	NA
2	Ceiling	Grey Ceiling tile (2×4) w/ Large Fissures and Medium Pinholes and Brown Backing	East Side of P-131ZZ	None Detected	NA
3	Wall	White Drywall Joint Compound	North Side of P-131ZZ	None Detected	NA
4	Mechanical	Grey Pipe Fitting Insulation	Centre of P-131ZZ	None Detected	NA
5	Flooring	White Floor Levelling Compound (cement-like)	South Side of P-132	None Detected	NA
6	Flooring	Yellow Vinyl Floor Tile (12"x12")	South Side of P-132	None Detected	NA
7	Ceiling	White Drywall Joint Compound	West Side of P-136	None Detected	NA

Table 1: Asbestos Analytical Results (1)

Sample	Type of Material Sampled	Description of Material Sampled	Location of Sample	Asbestos Type	Asbestos Content
8	Flooring	White Floor Levelling Compound (cement-like) w/Black Mastic	South Side of P-150	None Detected	NA
9	Flooring	Grey Vinyl Floor Tile (12"x12") w/ Brown Streaks	South Side of P-153	None Detected	NA
10	Wall	White Drywall Joint Compound	North Side of P-256	None Detected	NA
11	**Mechanical**	**Brown Cast Iron Joint Packing**	**Centre of P-256**	**Amosite**	**25 - 50%**
12	Mechanical	Red Mastic on Duct	North Side of P-256	None Detected	NA
13	Mechanical	Grey Pipe Fitting Insulation	South Side of P-244	None Detected	NA
14	Wall	White Drywall Joint Compound	North Side of P-218	None Detected	NA
15	Ceiling	Grey Fireproofing/insulation	North Side of P-222	None Detected	NA
16	Ceiling	Grey Fireproofing/insulation	North Side of P-320ZZ	None Detected	NA
17	Wall	White Drywall Joint Compound	East Side of P-320ZZ	None Detected	NA
18	Flooring	Grey Floor Levelling Compound (cement-like)	North Side of P-320ZZ	None Detected	NA

Note:

1. Bold values indicate positive for asbestos-containing

Table 1: Asbestos Analytical Results [1]					
Sample	**Type of Material Sampled**	**Description of Material Sampled**	**Location of Sample**	**Asbestos Type**	**Asbestos Content**
19	Flooring	White Floor Levelling Compound (cement-like)	North Side of P-320J	None Detected	NA
20	Wall	Grey Brick Mortar	North Side of P-340	None Detected	NA
21	Ceiling	Grey Ceiling tile (2×4) w/Small Pinholes and Large Non-Directional Fissures and Grey Backing	East Side of P-344	None Detected	NA
22	Wall	White Drywall Joint Compound	North Side of P-345	None Detected	NA
23	Wall	White Drywall Joint Compound	East Side of P-417	None Detected	NA
24	Flooring	White Floor Levelling Compound (cement-like)	South Side of P-424	None Detected	NA
25	Mechanical	Grey Pipe Fitting Insulation	P-415A	None Detected	NA

Table 2: Previous Mechanical Room Survey Asbestos Analytical Results[1]					
Sample	**Type of Material Sampled**	**Description of Material Sampled**	**Location of Sample**	**Asbestos Type**	**Asbestos Content (%)**
1	Mechanical	Grey Pipe Fitting Insulation	NE Corner of P-347	None Detected	NA
2	Wall	White Drywall Joint Compound	North side of P-347	None Detected	NA
3	Flooring	Black Mastic	West Side of P-347 west	None Detected	NA

Table 2: Previous Mechanical Room Survey Asbestos Analytical Results[1]					
Sample	**Type of Material Sampled**	**Description of Material Sampled**	**Location of Sample**	**Asbestos Type**	**Asbestos Content (%)**
4	Mechanical	Grey Fireproofing/Insulation	South side of P-347	None Detected	NA
5	**Mechanical**	**Amber Mastic on Duct**	**North Side of P-356**	**Chrysotile**	**5 - 10%**
6	**Mechanical**	**Black Mastic on Duct**	**North Side of P-356A**	**Chrysotile**	**1 - 5%**
7	**Mechanical**	**Red Mastic on Duct**	**Centre of P-358**	**Chrysotile**	**5 - 10%**
8	**Mechanical**	**Brown Parging (Contaminate) Under Medal Cladding**	**North Side of P-358**	**Chrysotile**	**5 - 10%**
9	Mechanical	Grey Pipe Fitting Insulation	NE Corner P-347	None Detected	NA
10	Wall	White Drywall	NW Corner of P-347	None Detected	NA
11	Mechanical	Grey Fireproofing/Insulation	South Side of P-358	None Detected	NA
12	Flooring	Red Mastic	SE Corner P-511	None Detected	NA
13	Flooring	Black Mastic	South Side of P-511	None Detected	NA
14	Wall	White Drywall Joint Compound	South Side of P-511	None Detected	NA

Note:
1. Bold values indicate positive for asbestos-containing

Table 2: Previous Mechanical Room Survey Asbestos Analytical Results[1]					
Sample	**Type of Material Sampled**	**Description of Material Sampled**	**Location of Sample**	**Asbestos Type**	**Asbestos Content (%)**
15	**Mechanical**	**Red Mastic on Duct**	**South Side of P-511**	**Chrysotile**	**1 - 5%**
16	Mechanical	Grey Parging Mud on Tank	Centre of P-358	None Detected	NA

Note:
1. Bold values indicate positive for asbestos-containing

Discussion and Conclusions

Asbestos

Ceiling building materials

Ceiling tiles
Two samples of (2x4) ceiling tiles suspected of containing asbestos were collected during the survey. One sample of grey (2x4) ceiling tiles with large fissures and medium pinholes and brown backing and one sample of grey ceiling tiles (2x4) with small pinholes and large non-directional fissures and grey backing were found **not** to contain asbestos.

Drywall Joint Compound
One sample of drywall joint compound suspected of containing asbestos was collected during the survey. This sample of white drywall joint compound was found **not** to contain asbestos.

Fireproofing/insulation
Three samples of fireproofing/insulation suspected of containing asbestos were collected during the survey and two samples suspected of containing asbestos were collected during a previous survey. All samples of grey fireproofing/insulation were found **not** to contain asbestos.

Flooring building materials

Floor Levelling Compound
Five samples of floor levelling compound suspected of containing asbestos were collected during the survey. Four samples of white floor levelling compound and one sample of grey floor levelling compound were found **not** to contain asbestos.

Vinyl Floor Tiles (12x12)
Two samples of vinyl floor tiles (12x12) suspected of containing asbestos were collected during the survey. One sample of yellow vinyl floor tiles (12x12) and one sample of grey vinyl floor tiles (12x12) with brown streaks were found **not** to contain asbestos.

Mechanical building materials

Cast Iron Joint Packing
One sample of cast iron joint packing suspected of containing asbestos was collected during the survey. This sample of brown cast iron joint packing was found to contain **25-50% Amosite** asbestos.

Asbestos containing cast iron joint packing was sampled and visually referenced in the following locations:

Second floor
- Rooms P-256, P-246, P-252, P-240

Duct Mastic
One sample of duct mastic suspected of containing asbestos was collected during the survey and seven samples of mastic suspected of containing asbestos were collected during a previous survey. One sample of amber duct mastic and one sample of red duct mastic were found to contain **5-10% Chrysotile** asbestos. One sample of black mastic and one sample of red mastic were found to contain **1- 5% Chrysotile** asbestos. Two samples of black duct mastic and two samples of red duct mastic were found **not** to contain asbestos.

Asbestos containing duct mastic was sampled and visually referenced in the following locations:

Third floor
- Rooms P-358, P-356A, P-356

Fifth floor
- Rooms P-511, P-501, P-521, P-531, and P-541

Pipe Fitting Insulation
Three samples of pipe fitting insulation suspected of containing asbestos were collected during the survey and two samples of pipe fitting insulation suspected of containing asbestos were collected during a previous survey

All samples of grey pipe fitting insulation were found **not** to contain asbestos

Parging (contaminant)
One sample of parging (contaminate) suspected of containing asbestos was collected during a previous survey. This sample of brown parging was found to contain **5-10% Chrysotile** asbestos. The parging (contaminate) appeared to be isolated to only this area under the cladding.

Possible exhaust parging from the emergency generator may be found underneath metal cladding in room P-356A. Further investigation may be necessary.

Tank Parging
One sample of tank parging suspected of containing asbestos was collected during a previous survey. This sample of white tank parging was found **not** to contain asbestos.

Miscellaneous

Debris

One sample of grey floor debris suspected of containing asbestos was collected during a previous survey. This sample of grey debris was found to contain **10-25% Chrysotile** asbestos.

Asbestos containing debris was sampled and visually referenced in the following location:

First floor

- Room W-88C

Wall building materials

Drywall and Drywall Joint Compound

One sample of drywall suspected of containing asbestos was collected during a previous survey. This sample of white drywall was found **not** to contain asbestos.

Five samples of drywall joint compound suspected of containing asbestos were collected during the survey and two samples of drywall joint compound suspected of containing asbestos were collected during a previous survey. All samples of white drywall joint compound were found **not** to contain asbestos.

Brick Mortar

One sample of brick mortar suspected of containing asbestos was collected during the survey. This sample of grey brick mortar was found **not** to contain asbestos.

Recommendations

Based on these conclusions, APSR recommends the following:

Prior to renovation activities, all identified asbestos-containing materials that may become impacted must be abated according to the asbestos abatement procedures as outlined by the *Alberta Asbestos Abatement Manual* (July 2009) published by Employment and Immigration, Workplace Health and Safety.

If any asbestos abatement is scheduled to occur within the rooms, it should be conducted by qualified personnel who are trained in working with asbestos. A qualified environmental consultant must also be present during all forms of asbestos abatement to ensure that appropriate work procedures are followed and to conduct appropriate air monitoring during the asbestos abatement process. They also ensure all contamination is contained and asbestos-containing materials are disposed of appropriately.

1. Asbestos-containing cast iron joint packing that may be impacted during future *r*enovation activities should be abated following low-risk wrap and cut abatement procedures, or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).

2. Asbestos-containing duct mastic that may be impacted during future *r*enovation activities should be abated following low-risk abatement procedures, or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009).

3. Asbestos containing brown parging (contaminate) should be abated prior to renovation following low-risk procedures or within a high-risk containment as outlined in the *Alberta Asbestos Abatement Manual* (July 2009). This contaminate was only observed in room P-356A and was not found in any other areas.

4. Abatement work may have been undertaken since APSR's previous mechanical room survey conducted in this building. This information was added to complete the limited full building survey and these results may not reflect current data.

5. Investigations within wall cavities and above solid ceilings for suspect asbestos-containing materials were not included within the scope of work for this project and should be sampled prior to impacting these materials.

6. Further investigation of all building materials is recommended due to the limitations of the survey, numerous renovations that have taken place throughout the site, inconsistencies with mixing potential asbestos materials and investigation within occupied or enclosed spaces.

APPENDIX I: LABORATORY ANALYSIS

ENVIRO-WORKS INC.
2514 Cameron Ravine Landing NW
Edmonton, Alberta T6M 0L3
Ph: (780) 457-4652
Fax: (780) 473-0767
www.enviro-works.com

CLIENT: APSR
PROJECT: Pavilion

Bulk (ACM) Identification:
NIOSH 9002 : Issue 2

Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
5-Feb-11	53796	1	FIREPROOFING INSULATION	100% Grey fibrous mix	ND		Cellulose, NFM
5-Feb-11	53797	2	CEILING TILE 2X4	100% Beige compressed fibrous mat	ND		Cellulose, P, MW, NFM
5-Feb-11	53798	3	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		P, NFM
5-Feb-11	53799	4	FLOOR LEVELING COMPOUND CEMENT-LIKE	100% Grey fibrous mix	ND		Cellulose, NFM
5-Feb-11	53800	5	VINYL FLOOR TILE 12X12	100% Grey cementitious mix	ND		NFM
5-Feb-11	53801	6	PIPE FITTING INSULATION	100% Yellow tile	ND		NFM
5-Feb-11	53802	7	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		P, NFM
5-Feb-11	53803	8	FLOOR LEVELING COMPOUND CEMENT-LIKE	100% White cementitious mix	ND		NFM

NFM–Non Fibrous Material
V–Vermiculite Mica
ND–None Detected
GF–Glass Fibre
P–Perlite
MW–Mineral Wool
SF–Synthetic Fibre

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Bulk (ACM) Identification:
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CLIENT: APSR
PROJECT: Pavilion

Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
5-Feb-11	53804	9	VINYL FLOOR TILE 12X12	100% Grey tile	ND		NFM
5-Feb-11	53805	10	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		NFM
6-Feb-11	53806	11	CAST IRON JOINT PACKING	100% Grey fibrous mix	Amosite	25-50	NFM
6-Feb-11	53807	12	MASTIC ON DUCT	100% Red soft mass	ND		NFM
6-Feb-11	53808	13	PIPE FITTING INSULATION	100% Grey fibrous mix	ND		Cellulose, NFM
6-Feb-11	53809	14	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		Cellulose, NFM
6-Feb-11	53810	15	FIREPROOFING INSULATION	100% Grey fibrous mix	ND		Cellulose, NFM
6-Feb-11	53811	16	FIREPROOFING INSULATION	100% Grey fibrous mix	ND		Cellulose, NFM

NFM-Non Fibrous Material
V-Vermiculite Mica
ND-None Detected
GF-Glass Fibre
P-Perlite
MW-Mineral Wool
SF-Synthetic Fibre

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Hazmat Survey Report - Van Vliet East, Van Vliet West and Universiade Pavilion
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AP Solutions and Resources

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Bulk (ACM) Identification:
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CLIENT: APSR
PROJECT: Pavilion

Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
6-Feb-11	53812	17	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		NFM
6-Feb-11	53813	18	FLOOR LEVELING COMPOUND CEMENT-LIKE	100% Grey cementitious mass	ND		NFM
6-Feb-11	53814	19	FLOOR LEVELING COMPOUND CEMENT-LIKE	100% White hard mix	ND		NFM
6-Feb-11	53815	20	BRICK MORTAR	100% Grey cementitious mix	ND		NFM
6-Feb-11	53816	21	CEILING TILE 2X4	100% Beige compressed fibrous mat	ND		Cellulose, P, MW, NFM
6-Feb-11	53817	22	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		NFM
6-Feb-11	53818	23	DRYWALL JOINT COMPOUND	100% White chalky mix	ND		NFM
6-Feb-11	53819	24	FLOOR LEVELING COMPOUND CEMENT-LIKE	100% White chalky mix	ND		NFM

NFM-Non Fibrous Material
V-Vermiculite Mica
ND-None Detected
GF-Glass Fibre
P-Perlite
MW-Mineral Wool
SF-Synthetic Fibre

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NIOSH 9002 : Issue 2

CLIENT: APSR
PROJECT: Pavilion

Date Analyzed	EWI. Log #	Sample #	Client Sample Information	Phases	Asbestos Type	%	Other Materials Detected
6-Feb-11	53820	25	PIPE FITTING INSULATION	100% Grey fibrous mix	ND		Cellulose, NFM

Cherie Laplante, B.Sc.
Lab Analyst

NFM=Non Fibrous Material
V=Vermiculite Mica
ND=None Detected
GF=Glass Fibre
P=Perlite
MW=Mineral Wool
SF=Synthetic Fibre

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2/9/2011 11:02 AM APSR Bulk Master Pavilion

Hazmat Survey Report - Van Vliet East, Van Vliet West and Universiade Pavilion
University of Alberta

APPENDIX II: SITE PHOTOGRAPHS

"Providing quantification and identification of hazardous materials and indoor air quality"
www.apsr.ca

FIGURE 1: Brown Asbestos Containing Cast Iron Joint Packing

FIGURE 2: Amber Asbestos Containing Mastic on Duct

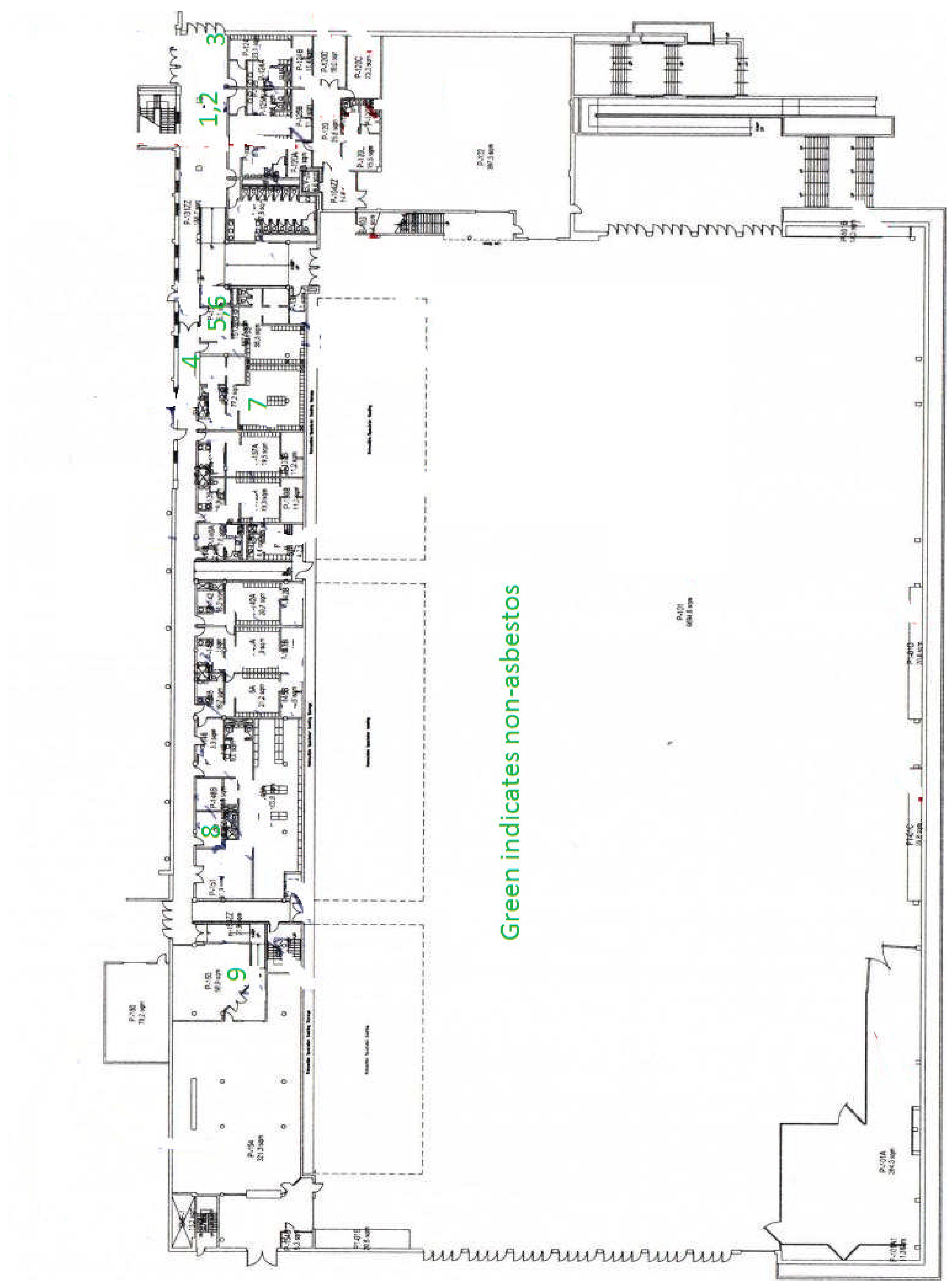
FIGURE 3: Black Asbestos Containing Mastic on Duct

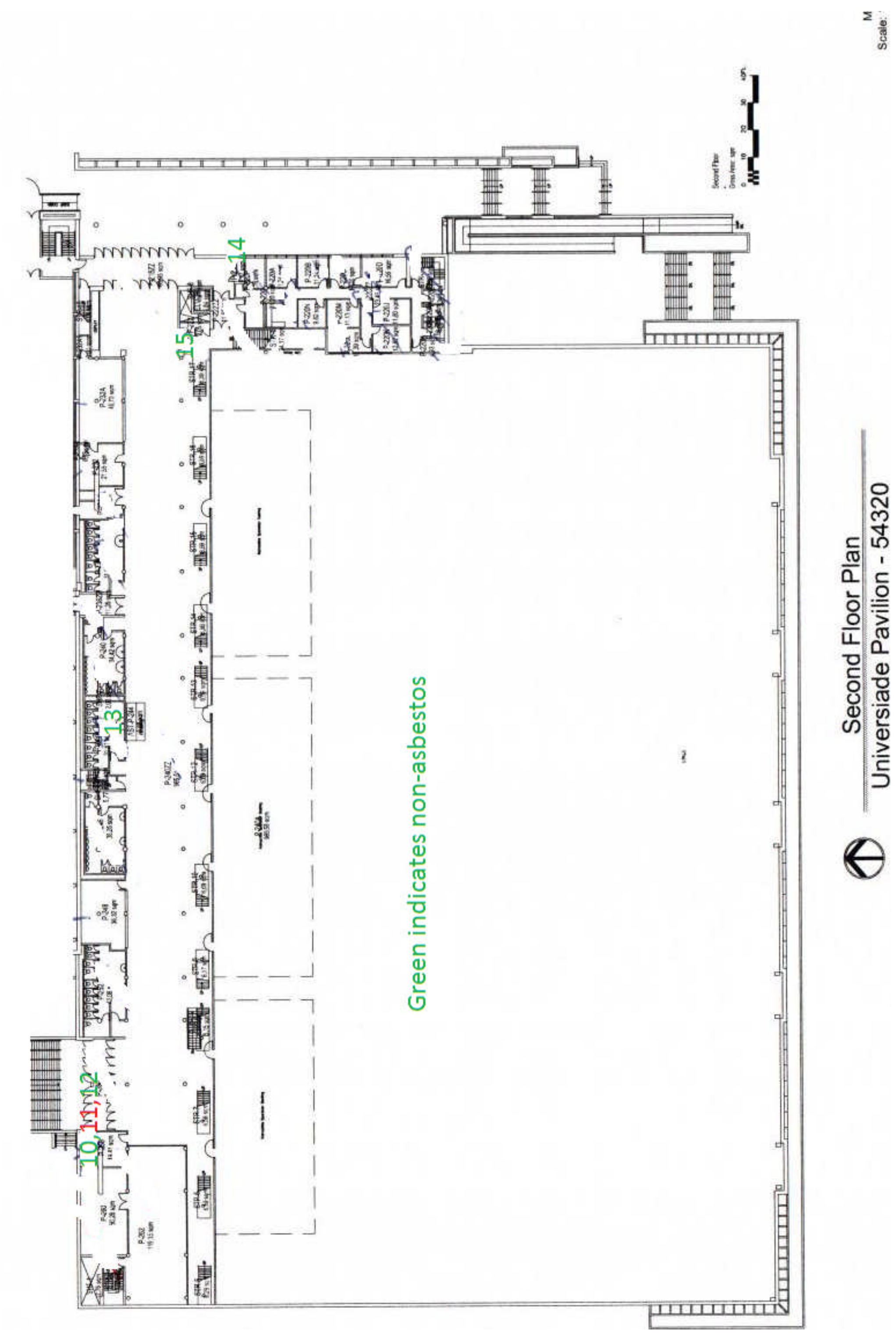
FIGURE 4: Red Asbestos Containing Mastic on Duct

FIGURE 5: Brown Asbestos Containing Parging Under Metal Cladding

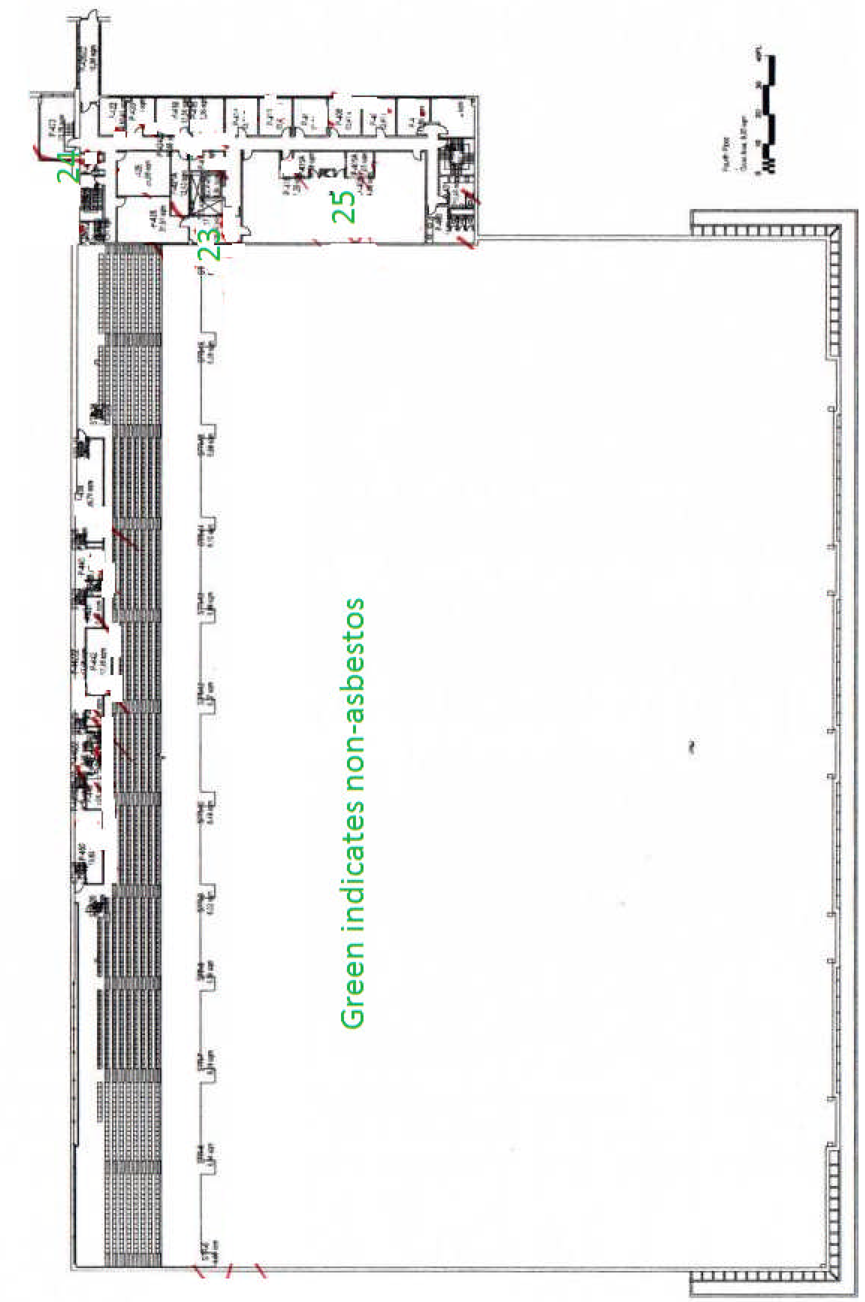
FIGURE 6: Red asbestos-containing mastic on duct.

APPENDIX III: SAMPLING LOCATIONS


Green indicates non-asbestos


Green indicates non-asbestos
Second Floor Plan
Universiade Pavilion - 54320


16,17,18
19
20
21
22
Green indicates non-asbestos


24
25
23
Green indicates non-asbestos

Limitations

APSR has made substantial efforts to identify and inspect all accessible areas for asbestos-containing materials within Van Vliet Physical Education Centre East, Van Vliet Physical Education Centre West and Universiade Pavilion located at the University of Alberta in Edmonton. Asbestos-containing materials may be present within concealed locations such as above solid ceilings, within floor spaces and within wall cavities. Further investigation and sampling of building materials may be required as renovation activities progress. Any quantification must be verified by the abatement contractor and are only estimates and approximations of asbestos containing materials.

The conclusions and recommendations contained in this report are based upon professional opinions with regard to the subject matter. These opinions are in accordance with currently accepted environmental assessment standards and practices. The data and findings presented are valid as of the dates of the investigation. The passage of time, manifestation of latent conditions or occurrence of future events may warrant further exploration at the properties, analysis of the data, and re-evaluation of the findings, observations, and conclusions expressed in this report. All data reported within this report is limited to the Scope of Work. The Scope of Work was defined by the request of the Client and the time and budgetary constraints imposed by the Client.

No warranty or guarantee, whether expressed or implied, is made with respect to the data or the reported findings, observations, and conclusions, which are based solely upon site conditions in existence at the time of investigation.

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