UNIVERSITY OF ALBERTA

Students' Union Building: Addition and Renovation

DESIGN DEVELOPMENT REPORT

Project No. 01257E0200 I 2013.04.09

DIALOG®

Table of Contents

L:\Buildings\01257E\02\2 DESIGN\ARCH\DRAFT REPORTS\Design Development Report\2013-04-04\SUB-DD Report-2013-04-09-vam.docx

1. INTRODUCTION

1.1 Purpose of the Report

This report documents the Design Development Phase for the redevelopment of the Students' Union Building Addition and Renovation. Design development refines the building design presented in the Schematic Design Phase through the development of architectural details and material selection. Engineering systems are refined and quantified. Preliminary structural engineering drawings illustrate the concrete foundation and steel framing system. Preliminary mechanical and electrical drawings illustrate major system components. Design development sets the direction for continued refinement and development of the design going into the preparation of Contract Documents.

The design team continued to meet with stakeholder groups and the Steering Committee to confirm user requirements, review design updates and confirm overall project direction. The Steering Committee was expanded to include representatives from the University Facilities and Operations and the University Bookstore.

DIALOG's architectural and engineering teams continue to confirm existing conditions through the review of existing drawings, on-site visits and meetings with the University's operations staff. The design recommendations provided in this report are based on the information gathered in this process and the proposed design solution.

1.2 Acknowledgements

The Students' Union Building Addition and Renovation 2012 was prepared by DIALOG in consultation with the Students' Union and University of Alberta representatives and the Students' Union Project Manager R.C. Steffes Management Ltd. The valuable contribution of these participants is acknowledged and greatly appreciated.

Students' Union Project Steering Committee

Students' Union Executive Committee Members
Andy Cheema, Vice President (Operations & Finance)
Saadiq Sumar, Vice President (Student Life)

Members of Students' Council
Eric Bellinger, Councillor (Faculty of Nursing)
Kevin Smith, Councillor (Faculty of Education)
Lyndon Crone, Councillor (Faculty of Engineering)
Josh Le, Councillor (Faculty of Business)

Dean of Students
Dr. Frank Robinson, Vice Provost and Dean of Students
Cheryl Luchkow, Assistant Dean of Students
Rob Washburn, Supervisor, Information Technology

University Facilities and Operations
Ben Louie, University Architect, P & PD
Keith Hollands, Associate Director, Design and Technical Services, P & PD
Rick Mercier, Project Manager, P &PD, PMO

Stakeholders
Keith Schmiedl, Director (University Bookstore)

Students' Union Management
Marc Dumouchel, General Manager
Margriet Tilroe-West, Senior Manager (Facilities & Operations)

Project Management
Russell Steffes, R.C. Steffes Management Ltd.

Consultants
Rob Swart, Principal (DIALOG)
Stephen Boyd, Principal (DIALOG)

Project Support Staff
Zach Fentiman, SUB Renovation Project Coordinator

Design Subcommittee

Andy Cheema, Students' Union Vice President (Operations & Finance)
Marc Dumouchel, General Manager of the Students' Union
Jane Lee, Senior Manager (Student Services)
Margriet Tilroe-West, Senior Manager (Facilities & Operations)
Russell Steffes, R.C. Steffes Management Ltd. Project Management
Rob Swart, Principal (DIALOG)
Stephen Boyd, Principal (DIALOG)

DIALOG Project Team

Rob Swart, Architect
Stephen Boyd, Architect
Darin Harding, Intern Architect
Ryan Renihan, Structural Engineer
Grant Kidd, Mechanical Engineer
Dianna Williamson, Mechanical Engineer
Larry Meszaros, Electrical Engineer

1.3 Project Methodology

The Students' Union completed a feasibility study in January of 2012, which subsequently led to a referendum providing funding for this renovation project. Work on program issues and Schematic Design began in May 2012. The Schematic Design Report was complete in December 2012 with the final report approved by the Facilities Development Committee (FDC) on December 21, 2012

The Students' Union wanted the process followed in the development of this project to manifest the Students' Union's core values. To that end, the Students' Union has sought to create a design process that is inclusive of all stakeholders, respectful and mindful of stakeholder and user priorities, and collaborative in character.

Overall guidance of the project rests with a Project Steering Committee, with the detailed design/consultation process overseen by a Design Subcommittee of that Steering Committee. The Dean of Students and Facilities and Operations each provided representation to the Steering Committee, and have been active participants at the Design Subcommittee level as well.

On February 1, the Students' Union hosted an interim design development presentation to the University of Alberta Facilities and Operations Group. Feedback from that presentation and subsequent reviews have been incorporated into this report.

Interior layout refinements were made in consultation with stakeholders. This process is essentially complete and the floor plans will be fixed very early in the Contract Documentation stage.

In terms of project management and architectural work, the Students' Union is working with Russell Steffes as the Project Management consultant, and with DIALOG as the project Architect. Russell was the Project Manager on the 1993 renovation and 2002 expansion projects. He knows the facility and Students' Union needs, and has a demonstrated record of success. Russell has worked with the Students' Union on the Feasibillity study, and is up-to-speed on the project.

DIALOG was originally selected by the Students' Union to assist in developing the Feasibillity study after a competitive RFP process. DIALOG has University of Alberta alumni working on the project, and is receiving advice on the project from the Vancouver lead of the new UBC SUB, another DIALOG project.

The University Architect's Office has also provided essential and timely feedback during the drafting of the Design Development Report.

2. OVERVIEW

2.1 History of SUB

The Students' Union Building was constructed as a collaborative project between the Students' Union and the University in 1967, gaining national recognition in TIME magazine as an innovative approach to meeting the needs of a growing campus.

The productive collaboration between the Students' Union and the University that began with building SUB has continued through to today, and has been a driver of a level of cooperation between students and administration in the provision of student services that is unmatched in Canada.

The building itself has been renovated and expanded as enrolment has grown and needs changed. SUB remains a contemporary and vibrant part of the campus mosaic and is the foremost hub of service and social life on campus.

This continued vibrancy did not occur by accident, but rather as the result of conscious choices made by the University and the Students' Union to maintain and upgrade the building as the needs of the campus have evolved. Since 1993, SUB has undergone two major renovations and one expansion, which together have resulted in greatly increased usage, the cementing of SUB as a key meeting point for the entire University community, and enhanced service provision through the creation of a 'one-stop' facility for most non-academic student services.

Table 1: Summary of Prior Projects

Year	Major Areas Affected	Project Synopsis	Lead	Approx. Cost
1993	Main Level, Lower Level	Creation of food court, relocation of Student Union services	Students' Union	$2.2 million (1993 $) $3.2 million (2012 $)
1996	2nd Floor	Centralization of University Student Services (USS)	University	$2.8 million (1996 $) $3.8 million (2012 $)
2002	Infill of courtyard	Creation of additional USS and social space	Students' Union	$6.9 million (2002 $) $8.3 million (2012 $)

Student enrolment continues to grow, increasing from 26,749 FTE in 2000 to 34,923 in 2012 (*2002-03 Data Book*; *2012 Institutional Fact Sheet*). Enrolment growth is expected to continue for the foreseeable future.

2.2 2012 Renovation Project Background

SUB remains a solid, well-run and heavily-used facility that, in some ways, is a victim of its own success.

Over the last few years, demands for more and better quality space of various types have been identified through the 2010 General Space Program for SUB. The Students' Union has also committed itself to a series of strategic initiatives, aligned with the University's own strategic documents that require a reconsideration of how space is utilized in SUB.

The Students' Union has explored and discussed a wide range of potential solutions to these demands and needs with the University, from expansion opportunities to reconfigurations of the existing building. Immediate expansion of the building, the Students' Union's initially-preferred option, was not found to be currently feasible, though it remains a possibility in the longer term.

After determining that expansion would not be possible at this time, the Students' Union turned its attention to what could be done to ameliorate the space issues identified in the General Space Program. The Students' Union began reviewing other alternatives to improve utilization of space, and to create the kinds of space required by its strategic initiatives, within the general footprint of the building and its immediate environs. It was also critical to assess what these changes might cost, so that the affordability of any project could be assessed. The Students' Union elected to conduct a feasibility study to address these questions.

To do this analysis, the Students' Union retained the services of the project manager who managed the 1993 renovation and the 2002 expansion as a consultant. DIALOG was selected as the consultant on the feasibility study. The costs of the Feasibility study were borne by the Students' Union through an allocation from capital reserve funds.

After several months of consultations and discussions with stakeholders, the team completed a formal feasibility study. This defined the general parameters of a renovation that would address many of the issues the Students' Union was seeking to resolve, and provided an estimate of the financial scale of such a project.

Based on the feasibility study, Students' Council approved a referendum for a $9 per term fee for Students' Union facility development. The referendum passed in March 2012.

Over the summer and fall of 2012, the Students' Union has met with stakeholders and worked with DIALOG to create this Design Development Report.

2.3 Project Goals

The Students' Union has established three key goals for this project:

- Expand student engagement activity on campus;
- Improve provision of student services; and
- Enhance the long-term viability of SUB.

These goals are tightly aligned with the Students' Union's 2011 Strategic Plan and its engagement goal, in particular, is in direct alignment with the Dare to Discover Academic Plan.

2.4 Expand Student Engagement Activities

The Students' Union, in its conduct of business, strives to provide students with an experience of engaged involvement that demonstrates the power of individuals, working together, to promote real change. In this, we directly align with the University's thematic goal of creating better citizens.

True engagement, the driver of both student success and long-term connection to the institution, requires both curricular and extracurricular components. Cultivating the extracurricular component of engagement is, in the Students' Union's view, one of its key responsibilities, a duty under the PSLA, and the most effective way for it to support the University's academic plan and to create the kinds of school bonds upon which long-term alumni support rests.

With that in mind, a key program driver of this renovation project is the question of how we can adapt the building to foster greater student engagement. In our vision, this entails creating the spaces and facilities required to allow students to come together: social and study space, as well as much-improved facilities to support our over 400 student groups.

A key part of this vision includes the creation of an involvement centre that connects students with volunteer and student group opportunities, works with the University to promote the many academically-oriented involvement options available to students, and provides information on involvement in University and Students' Union governance.

2.5 Improve Service Provision

A key goal of the renovation is to improve service provision. In planning this project, considerable attention has been paid to the interplay of space design and operational impacts, with an eye to both improve efficiency and effectiveness.

The renovation will improve service provision by:

- Creation of a Student Involvement Centre, as noted above;
- Providing easier access and improved visibility to Students' Union-operated services;
- Intelligent co-location of services to generate efficiencies, increased collaboration, and improved integration;
- Interior design centered around collaborative workspace concepts and greater use of open workspaces – fewer hallways and doors, more spaces designed for impromptu meetings and discussions; and
- The addition of select retail and/or personal care services.

2.6 Enhance the Long-Term Viability of SUB

SUB, as a key facility on campus, needs to be kept current and relevant if it is to fulfill the college union role. This renovation project is intended to address current weak spots in how the building has been stacked and developed over time.

SUB also plays a key role in the long-term financial viability and operational capability of the Students' Union. From providing consistent, significant long-term business and lease revenue to ensuring that there are unique programming capacities that both the Students' Union and student groups can use, SUB plays a central role in the Students' Union's daily activities.

In order to ensure the continued ability of the facility to meet changing campus needs, there are a number of specific design priorities that this project is intended to address:

- Improved utilization of existing space.
- Improve the quality of the space. Currently the Student Groups and Services are located in a "rabbit's warren" of small offices and shared work spaces.
- Improved permeability of the building to foot traffic, including direct access to the Lower Level, and improve circulation. Developing cohesive, more walking-friendly frontage will help draw people into the building and create an active front door.
- Improved visibility of, and access to, Lower Level operations. The Lower Level is underutilized and, while not hard to access, is somewhat hidden. There are no clear sightlines into the Lower Level, and access points are not always obvious to building users. Access to and visibility of the Lower Level will greatly increase the usefulness of Lower Level space and increase usage of the building.
- Introduction of natural light into the Lower Level, particularly in areas where student social activities occur. Natural light, particularly in winter months improves the quality of social spaces and is generally more attractive than space that receives no natural light.
- Reconfiguration of select tower floors and allocation of space to meet emerging needs and better align with the General Space Program.
- Provide additional space to accommodate immediate needs that cannot be met through redevelopment and improved utilization alone.

2.7 Referendum Requirements

In addition to the primary goals, the renovation must meet certain criteria laid out in the funding referendum, specifically:

- Minimize the environmental footprint of Students' Union operations;
- Increase and improve the student services and club space;
- Create more meeting rooms for student groups;
- Increase study, relaxation, and social space; and
- Alignment to University Strategy and Planning.

2.8 Dare to Discover

The Students' Union's engagement-related goals for the renovation are in alignment with and in direct support of three of the four Dare to Discover cornerstones:

- Talented People: Specifically, supporting leadership development and diversity. The 'involvement centre' idea is also akin, conceptually, to the principles behind welcome centres.
- Learning, Discovery, and Citizenship: The Students' Union's focus on supporting student groups, and providing additional related services and leadership programming, is an effort to create the best possible leadership and citizenship experiences for our students. This is what the Students' Union, in the abstract, is about. It is a key driver in our engagement efforts.
- Connecting Communities: Global and local engagement are outcomes of the increased effort to support the incredibly diverse range of student groups and activities that this renovation represents. The renovation also seeks to develop more of the kind of social spaces that foster interaction and a sense of community.

2.9 Long-Range Development and Sector Planning

The project aligns with the Long Range Development Plan of the University, and its derivative sector plans. The Students' Union Building is located in Sector 3 (LRDP 2002, Sector Plan 3&4 Dec. 2004) and serves as a primary interior node. The proposed redevelopment of the south of SUB seeks to contribute to elements of the sector vision, notably:

- Developing new, and reinforcing existing, pathways (both interior and exterior) within a hierarchy that creates: distinct zones for pedestrian and/or vehicular access and movement; ease of way-finding; desirable Campus character development; and appropriate interfaces with other University Sectors and neighbourhoods.
- Introducing pedestrian pathway, node and landmark enhancements that promote interaction, animation, interpretation, accessibility, way-finding, and activity within a safe, secure, attractive and pedestrian-scaled environment.
- Implementation of the principles of sustainability, wellness, flexibility, adaptability, manageability, safety, and universal accessibility (including a strategic servicing strategy) in the design and development of Sector buildings, pathways and open space.

- Development of strong and meaningful visual and physical connections between interior and exterior spaces that define and enrich public space, create focal and activity points, and enhance way-finding.

It is important to note that, while the LRDP provides for SUB to grow to the west and southwest, this development relieves the pressure for a true expansion of the Students' Union Building for five to ten years. The proposed renovation allows for the redevelopment of the Lower Level, which has become overly compartmentalized and challenging to navigate for building users. In essence, the addition of a "front porch" allows the Students' Union to channel and reproduce the Building's current strengths in order to unlock the potential of its less-effective space inventory. Further, it is intended to serve as a more welcoming face, aligning with the Students' Union Building's mandate as a welcoming, "living room" on campus.

2.10 SUB Space Program

A General Space Program (GSP) for SUB was developed in 2010, and identified a number of areas for improvement or expansion. Given the current constraints on expansion, it is impossible to address all the needs identified in the GSP, but this project does seek to address many of the core concerns. It should also be noted that the GSP is a tool to quantify space needs but as these are constantly changing, it becomes a starting point for initiating the design process.

In addressing the needs identified in the GSP, the project has implemented two key strategies for making better use of existing space: increasing space efficiency through operational changes that reduce per-person and circulation requirements; and re-thinking whether particular space needs are occasional/seasonal or constant.

In terms of physical space, the project presents significant net increases to common spaces – lounges and bookable spaces – and small increases to the usable space allocated to Students' Union services and student groups.

CJSR and the Chaplains Association will experience some small losses in net space, which are to be mitigated by policy regarding bookable spaces that essentially replaces desired dedicated space with shared space. An example of this is studio space; the Gateway, CJSR, and select Students' Union departments have indicated that one of their needs is for space suitable for audio and video production. This need will be met by equipping one of the bookable spaces with appropriate acoustic measures and technical infrastructure.

The common theme in how this project is approaching the needs identified in the GSP is the idea of space efficiency. For example, with student services, greater use of open-plan workspaces and an improvement in circulation efficiency will greatly help make better use existing square footage.

Extensive discussions with the Bookstore have identified their space needs as fundamentally seasonal. In order to improve overall space utilization and accommodate additional programming, the design reduced Bookstore space but makes allowances for Bookstore usage of some common space during rush periods.

3. ARCHITECTURAL DESIGN

3.1 Site Analysis

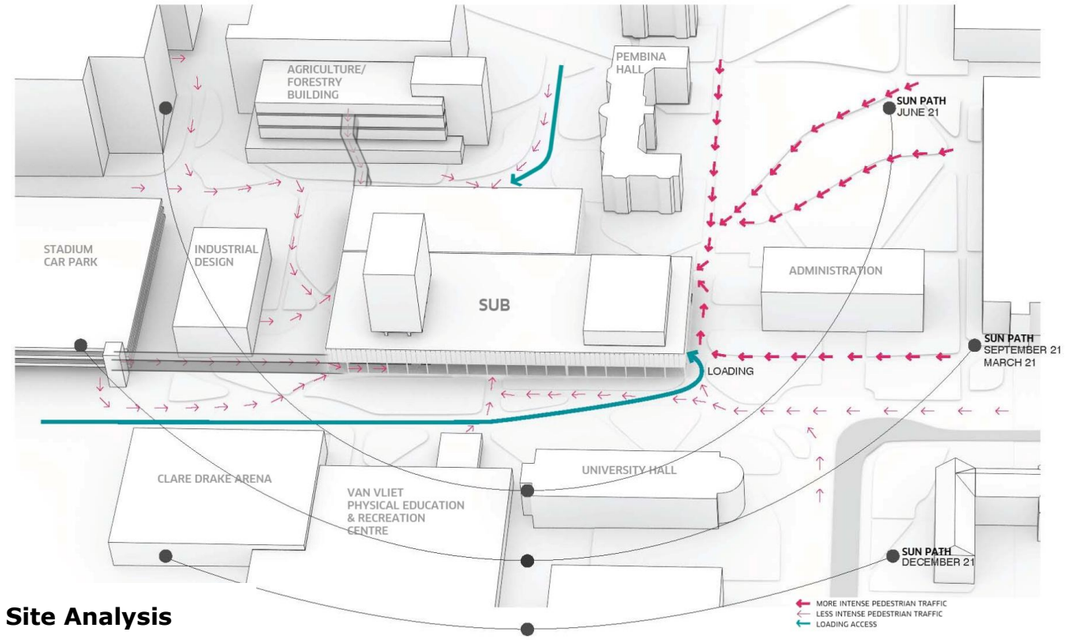
3.1.1 Site Context

The Students' Union Building (SUB) is located on the north side of 89th Avenue between the Administration Building to the east and the Industrial Design Studio to the West. Other buildings adjacent to SUB include:

- Van Vliet Centre (VVC) and University Hall - on the south side of 89th Avenue
- Pembina Hall and the Agriculture Forestry Centre to the North

The topography on the north and east side of SUB is generally flat and aligns with the Main Level elevation. On the south side, 89th Avenue starts to slope down on the east side of SUB dropping approximately four metres in elevation at the west end of the site.

Between 114th Street and the entrance to the Stadium Car Park, 89th Avenue is configured as a well landscaped pedestrian bicycle mall with an asphalt path approximately 9m wide. This path also provided service vehicle access to the Horowitz theatre loading dock on the east side of SUB and DATS access to the Steadward Centre within the VVC. A restricted vehicle access road on the north side of SUB provides access to the existing loading dock.



Site Analysis

3.1.2 Existing Building Entrances

SUB is served by seven entrances of which five are primary pedestrian entrances:

- South Entrance off of 89th Avenue immediately north of the VVC
- North East Entrance with access to the Alumni Walk and the Central Quad
- New Exit Stair Entrance with access to Pembina Hall and Central Quad
- North West Level 2 pedestrian bridge to the Agriculture Forestry Centre
- Level 1 west entrance to the Stadium Car park pedestrian bridge and the outdoor stair down to 89 Avenue

The north entrances providing access to the Quad and the Engineering precinct experience the highest pedestrian volumes as most of the other academic buildings on campus are located north or north east of SUB. The west entrance experiences pedestrian traffic from the Windsor Park residential area, the student residences and the Stadium Car Park. The south entrance is used primarily by students accessing the VVC and the Health Sciences Precinct south of 87 Avenue.

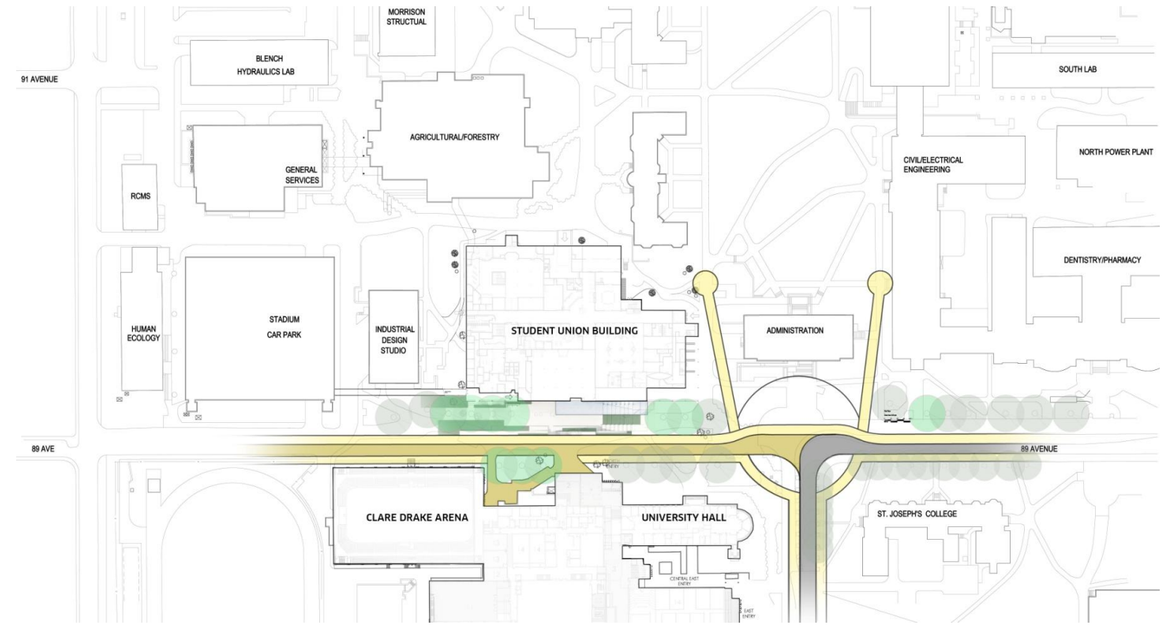
3.1.3 University of Alberta Planning Context

The 2012 Addition and Renovation Project is designed to conform to the University of Alberta's Long Range Development Plan and in particular the Sector 3 Plan in which it is located. The Sector Plan defines 89th Avenue as:

> *"A major pedestrian spine that should be enhanced in its surfacing, landscaping and activity areas. Sufficient distance should be maintained to this pathway to enhance sunlight penetration, landscaped verges, space that does not feel confined, and some views from the pathway to nearby and some distant facilities. The pathway should engender a sense of continuity, anticipation, and integrity, without further encroachment or constraint from facilities... Consideration should be given to developing exterior nodes to the northeast and south of the building to increase the outdoor potentials for student/staff passive activities."*

(University of Alberta Long Range Development Plan: Sector Plans 3 and 4, Prepared by Gibbs and Brown Landscape Architects 2004, Page 113)

This project is designed to reinforce 89th Avenue as a major, landscaped pedestrian spine and to create a node on the south side of SUB that provides inviting and engaging spaces for student/staff social activities.



89th Avenue Pedestrian Spine

3.2 Preliminary Project Description

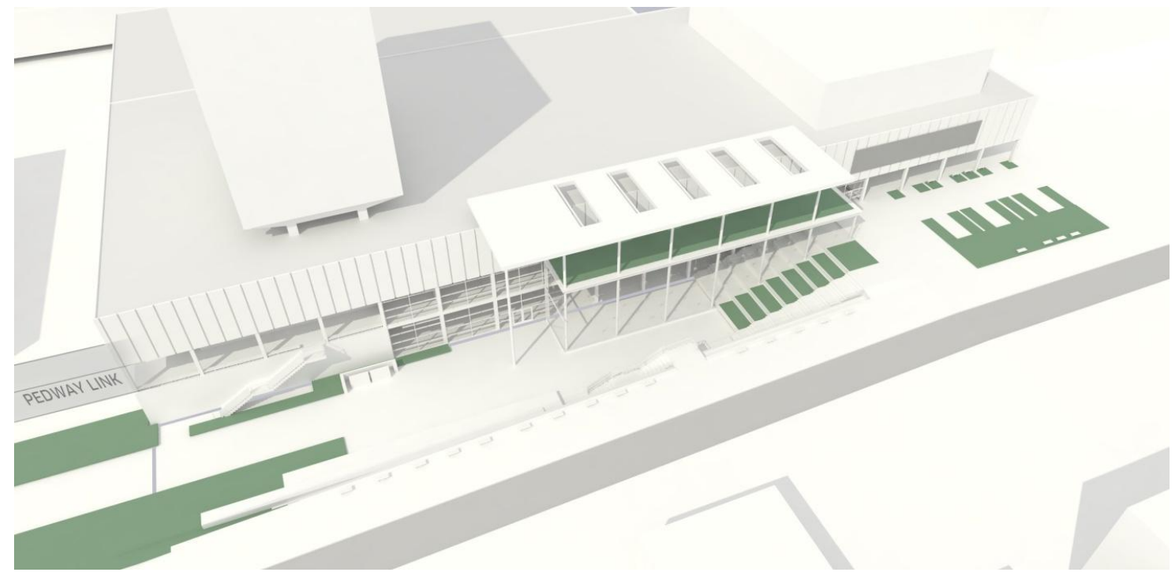
3.2.1 Overview

The architectural and interior design themes established in concept design and schematic design phases are continued and refined in Design Development. The Lower Forecourt and interconnected atrium space on the south side of the building are maintained and further refined to more effectively integrate SUB into the University's Sector Plan and to more effectively integrate Lower Level and Main Level activities.

3.2.2 Atrium

A two storey glazed atrium, 6m wide by 33m long and encompassing the Lower Level and the Main Level, is added onto the south side of the SUB. The primary purpose of the atrium is to provide a visual and spatial connection between the Lower Level and the Main Level; it is not required for program space. The atrium is constructed in a new Lower forecourt, to provide for daylight penetration into the lower level and to make the Lower Level and the activities it accommodates more visible from the street.

At the existing south perimeter of the Lower Level, the existing concrete planter is removed and the foundation wall between the building's structural column grid is removed to connect the Lower Level to the atrium. The remaining structure is reinforced to accommodate the existing building loads (see Section 4.0 Structural).



Aerial view showing the Lower Plaza, landscaped terrace, atrium and entry canopy.

The east 15m of the atrium accommodates a tiered floor area that provides a transition from the Main Level to the Lower Level. Seven tiers, each 2,000mm deep by 600mm high and 6,000mm wide provide a natural area in which students can lounge and view activities on both the Lower and Main Level levels. A staircase approximately 2m wide is incorporated into the tiers, providing access between the two floors and to each tier. In the lower forecourt, concrete tiers with landscaped surfaces match the tiers in the atrium. These matched tiers, separated only by the atrium glazing reinforces the role of the atrium as a transition between the indoors and the out of doors.

The three perimeter walls of the atrium will be glazed with triple pane "spider" glass to maximize the building's transparency while still providing for improved energy performance. A fritted pattern with approximately 30% opacity is applied to the glazing to moderate solar height gain during the summer and provides visual interest and texture to the façade while still permitting a high degree of transparency. The frit pattern commences approximately 2 metres above grade providing the building's occupants with an unobstructed view from the grade level.

The atrium roof is aligned with the atrium perimeter to enhance the overall simplicity of the atrium massing. The atrium roof is approximately 300mm below the second level. The atrium roof will be designed to accommodate a green roof at some point in time in the future but will not be installed as part of this project. The atrium ceiling is designed to align with the existing Main Level ceiling to provide for a more seamless transition between the two. With regards to maintenance, both interior and exterior windows can be cleaned by genie lifts or window washers on bosun's chairs, particularly where the tiers occur. Ceiling mounted fixtures can be accessed by a genie lift and over the tiered area, by a "zoom boom".

Atrium looking east towards the tiers.

3.2.3 Lower Plaza

A lower plaza aligned with the Lower Level, extends along the south face of SUB from the east side of the atrium approximately 25m beyond the west end of SUB were it meets the existing building grade. The plaza extends 7.5m beyond the existing atrium face into 89th Avenue. The east side of the Plaza has seven landscaped tiers that cascade down from the street level to the Lower Level plaza. These are identical in size to the interior tiers described in 3.2.2. The exterior tiers are designed to accommodate hardy ground cover that can withstand student seating. A low head underground sprinkler system is contemplated for these tiers.

Tiered retaining walls on the south side of the plaza provide a transition from the lower plaza level to 89th Avenue. These retaining walls incorporate crenellated concrete seating and a landscaped terrace that is 500mm below the main level. The seating is equipped with anti skateboarding inserts as approved by the University of Alberta. A glazed guard is provided at this level in conformance with the building code. As this terrace is less than 600mm below the main street level, a guard is not required at street level. This enhances the visibility of the lower plaza and Main Level by providing a more unobstructed view from street level.

Precast concrete seating is provided just south of this retaining wall. The seating is spaced to provide accessibility around the seats and enhance the lower plaza's visibility from 89th Avenue. The space between the seats is sized to prohibit the passage of vehicles and provides a protected location for street lighting. The top of the precast concrete seating is provided with anti-skateboarding inserts as approved by the University of Alberta.

An entry stair providing access from street level to the lower plaza is located along this retaining wall. The stair is located so that it forms part of a convenient pedestrian pathway from the VVC to SUB's Lower Level entrance off the plaza.

During Design Development the surrounding grades were surveyed and it was determined that the lower plaza cannot be drained to the west. A civil engineer has been engaged to determine the best approach to drain the lower plaza of rain and meltwater. This work is further referenced in Section 6: Mechanical Design.

View of Lower Plaza looking east.

The lower plaza is intended to accommodate student social activities and special occasions such as farmers' markets and flea markets, pancake breakfasts, and performances by individuals and small troupes. In this respect it is expected to function as the node identified in the Sector Plan. Services including natural gas outlets for a mobile gas barbeque and, weather proof electrical outlets are provided to support these activities.

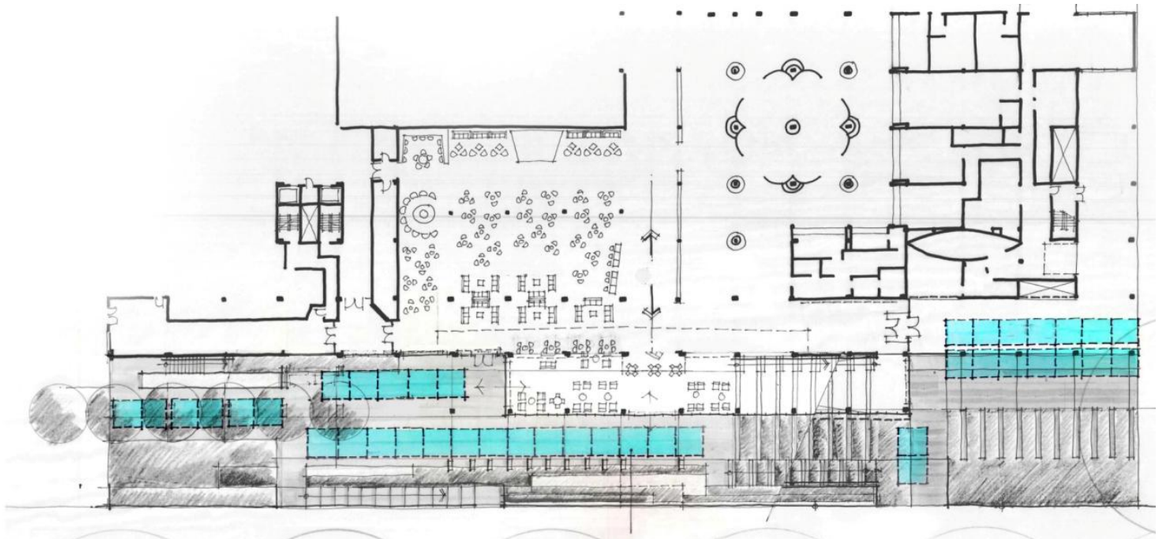
The lower plaza and upper pedestrian paths are designed to accommodate genie lifts, zoom booms, trucks and snow removal equipment. Snow removal from the lower plaza and the street level can be undertaken with machines. Snow removal at the steps leading to the lower plaza will be done by hand.

Over the long term the lower plaza will be integrated into the University's plan described in 3.1.3. As this addition and renovation project will be completed prior to the University's project commencing, the road south of SUB is realigned in two locations to accommodate the lower plaza while still providing pedestrian and restricted vehicle access from 116th St. to the east side of SUB and the Administration Building. The DATS drop off area south of SUB is maintained. The west entrance to the Lower Level will be transitioned to the existing landscaped area and road north of the Industrial Arts building.

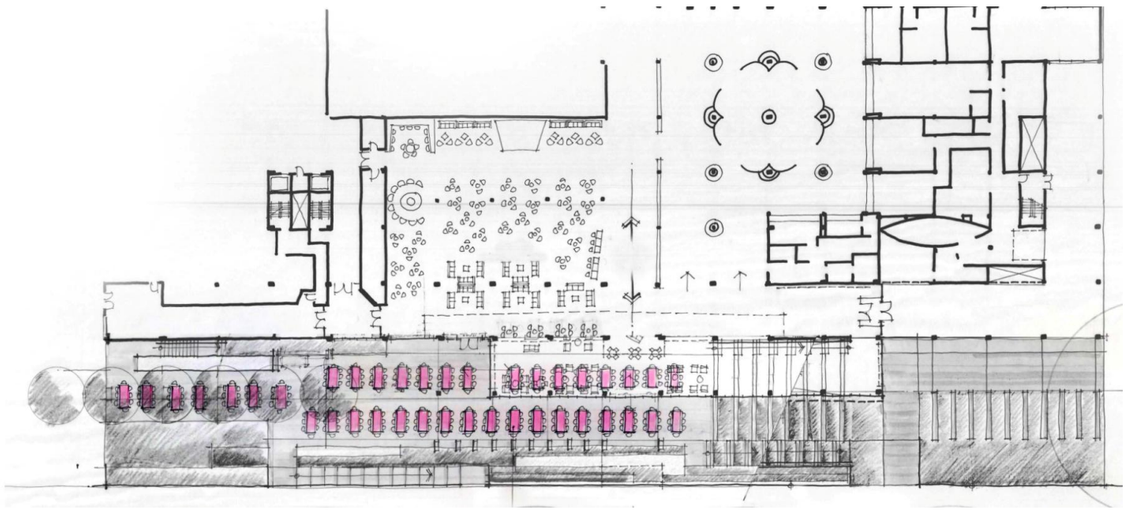
3.2.4 Entrances and Openings

The existing main entrance on the south side of SUB is removed to accommodate the atrium and the lower plaza. A new Main Level entrance is provided on the east side of the atrium adjacent to the existing covered walkway in the southeast corner. This entrance has doors facing east along the walkway and south towards the VVC. The quiet lounge that previously occupied this space is relocated to the Lower Level. This entrance serves pedestrian traffic using 89th Avenue east of SUB and the VVC.

On the Lower Level a new entrance opening onto the lower plaza is located immediately west of the atrium. This entrance provides access from the Lower Level to the VVC via the plaza stair case or west along 89th Avenue via the lower plaza.



Lower Plaza Farmers' Market layout.



Lower Plaza – Pancake Breakfast layout.

The entrances will be designed and detailed to the satisfaction of the University Architect so that they maintain the intent of the original building design, are inviting and easily identified and can be easily maintained. The Students' Union will maintain the outdoor areas within 3m of each entrance.

A new stair in the building's south west corner provides access from level 1 to 89th Avenue west of SUB.

Glazed overhead doors are provided on the west side of the atrium at the Lower Level and the south side of the atrium on the Main Level adjacent to the new entrance. These doors can be opened on special occasions during clement weather to facilitate student social activities that span indoors and outdoors. They will be interlocked with the building's mechanical system.

A concern associated with openings to the outdoors is the possibility of increased dust accumulation and insect, bird and rodent infestation. A number of facilities in Edmonton operate with similar doors including: Save on Foods, restaurants on Whyte Avenue and the new Holes facility in St. Albert. It is anticipated that the controlled use of similar wall openings can be operationally accommodated by the Students' Union.

3.2.5 Entrance Canopy

A slotted entry canopy extending beyond the 2nd Floor roof gives the new addition a more significant presence, celebrates the new addition and entry plaza as a node and engages the Lower Level plaza entrance. The canopy slots allow for the play of light and shadow on the building's façade increasing visual interest and making the overall design composition more dynamic.

View from 89th Avenue towards the Lower Plaza and the Lower Level Entrance.

3.3 Program Spaces

3.3.1 Student Services

Students' Union Services

Two "collections" of student services adjacent to one another are located on the Lower Level. This will allow current operational requirements to be met, while also allowing for modest program expansion of 47 m^2 (506 ft^2). This increase addresses some of the need identified in the 2010 General Space Program and reflects ex-post needs assessments (e.g. Co-curricular Record Coordinator.) The spaces maintain separate offices for senior staff, and include open-plan spaces for associate director and coordinator level staff members. Utilization of open space work environments for student services allows the Students' Union to stem expansion needs, by utilizing the space it currently controls more efficiently.

The north services "collection" is proposed to hold the Centre for Student Development, Orientation, Sustain SU, and Safewalk. The key feature and similarity of these services is the use of a volunteer component for service delivery. The proposed space plan allows for an appropriate shared volunteer muster/staging zone, a staff/volunteer servery, and adjacent meeting spaces. The separable, lockable servery will serve the needs of service staff and volunteers and also function as the home base for the SustainSU reusable dish program. The servery will be not be public, but would have the flexibility to be used for private bookings (e.g. potlucks) and for temporary storage of food product during events taking place in the exterior plaza. The servery would be equipped with a sink, sanitizer unit, microwave, refrigerator and freezer. The only program element in this category not being considered for inclusion is the SustainSU Bike Library project. Discussions regarding its location are proceeding.

The south services "collection" is proposed to hold the administrative components of both Infolink and Student Group Services. Again, in this collection, the Students' Union seeks to implement an open space concept, while maintaining private offices for service management. The combination of these two services allows the Students' Union to implement a "Student Involvement Centre" front desk jointly staffed by employees of Infolink and Student Group Services. Queuing ability is considered for this area, as it is anticipated to serve as a U-Pass distribution point. This area also requires secure space for cash processing and exam registry functions.

Both "collections" allow for the services to maintain a highly visible and accessible storefront. Visibility and the "desire for an address" represents a major need identified in the 2010 General Space Program.

In conjunction with the improvements to student group spaces addressed in a subsequent section, the proposed program allows for the following 2012 Renovation Referendum criterion to be met: "The goal of the renovation shall be to increase and improve the student services and club space."

Student Governance

The Students' Union proposes that the Dean of Students Office assumes control of Students' Union controlled spaces on the 4th Floor (currently programmed as meeting rooms and a private office) and the Students' Union assumes control of Dean of Students controlled spaces on the 6th Floor. It is expected that spaces on the 4th Floor would be reconfigured to meet functional requirements of the Office of the Dean of Students, is included in the project budget, and has the support in principle of Office of the Dean of Students. The 6th Floor is proposed to serve as the primary hub for non-executive student governance operations.

Student Governance includes the Students' Union's elections office (currently occupying part of the 3rd Floor); Discover Governance (occupying an office couplet on the Lower Level). The program is achieved with a combination of private offices, bookable meeting rooms, informal, public meeting spaces, and open-concept workspaces. Furthermore, the adjacencies of these departments will allow for a more productive work environment, and meets targets established in both the 2010 General Space Program and subsequent needs assessments.

SU Health & Dental Plan

The studentcare.net/works ("SU Health and Dental Plan") office currently occupies space in the Lower Level and will be relocated to the 6th Floor. Program elements included are anticipated to be identical to the current configuration (i.e.: small reception and seating area with front desk, along with a separate private space to accommodate administrative functions.

Student Group Spaces

The Students' Union believes in the vital contributions of student groups to forming a well rounded, vibrant, and creative campus community, and endeavors to support the coordinators and members of these groups by providing spaces that give student groups an "address" and visibility. (Note that the administrative component of Student Group Services proper is discussed in the previous section.)

In conjunction with the improvements to the student services spaces addressed previously, the proposed program allows for the following 2012 Renovation Referendum criterion to be met: "The goal of the renovation shall be to increase and improve the student services and club space."

Currently some offices are used for storage/administration on the 6th Floor. The 2010 General Space Program expects provision of proper storage facilities (e.g. designated storage rooms, lockers, and mailboxes) will reduce the demand for private office spaces, and allow these spaces to be better distributed for their intended/program use. In order to achieve this, it is proposed that all student group office spaces are proposed to be co-located on the Lower Level, and dedicated storage/lockers/mailboxes provided.

3.3.2 Common Space

Common spaces – those parts of the building available to be enjoyed by all members of the University community – activate the building and showcase its personality and its amenities. Lounges, hallways and plaza space work together as a system that links together each functional area while behaving as a canvas for the users that converge within it. Collectively, these interstitial spaces encourage SUB's role as a living room on campus – a destination for people, especially students, to gather, learn and relax in a dynamic, community environment.

The proposed design provides a substantial increase in common space, including a new Lower Level lounge and atrium, an adjacent outdoor plaza and added circulation.

The Lower Level lounge is inspired by the successful and heavily used great room on the Main Level. The lounge will extend from the atrium, including the indoor terrace, towards the Bookstore, and will offer high quality day-lit space. Over 200 new seats will serve customers of renewed retail spaces as well as function as overflow from the Main Level food court during peak hours. Added capacity reflects the expectation that the renovation will draw more traffic into SUB, and the addition of natural light in the Lower Level is itself expected to be an attractive feature. Through its adjacency to services and student group space, the lounge is expected to enhance visibility of these operations and in turn promote student engagement.

Two new entrances are added to the building – one at the southwest into the Lower Level and one at the southeast into the Main Level, replacing the current south entrance. The southeast entrance displaces an existing quiet room, known colloquially as the "nap room." A similar space is added near the aforementioned southeast entrance.

Lower Level common space extends beyond the south curtain wall into an open outdoor plaza. This space, which occupies 580m2 or 6,240 square feet, is a key feature of the redeveloped south face, adding functionality, presence and penetrability to the building. The plaza may serve as passive common space with seating and radiant heat, weather dependent. The plaza may also serve as an active programmable venue. Potential uses include farmers' markets, outdoor yoga, theatre, concerts, barbeques and pancake breakfasts. These uses require provision of power, sound amplification and gas in later design.

3.3.3 Events and Meeting Space

All but two of the Students' Union's existing bookable meeting rooms are located in the tower – the exceptions are the Lower Level Meeting Room and the Student Group Services meeting room. These rooms serve the needs of Students' Union departments and Student Groups and are available from time to time for booking by other user groups.

In addition to the Lower Level meeting rooms, there is currently one bookable meeting room on the 3rd floor, four on the 4th and one on the 6th. These rooms lack appropriate audiovisual functionality, and the smaller rooms are overly narrow, resulting in increased wear and tear and reduced user comfort.

This proposal transfers the 4th floor meeting space to the Dean of Students office and deletes the remainder, replacing them with ten bookable meeting rooms in three locations: one on the 6th floor, one adjacent to student group and student services offices, and eight located in a bank on the north end of the Lower Level. The first will serve student governance functions, especially committees of Students' Council. The second will be reserved for the use of student services staff and student group

members. The cluster of meeting rooms will create a versatile meeting, event and conference facility to serve the needs of internal, University and community users. These latter rooms will be fully equipped, and one meeting room pod will be adaptable into a single larger space.

Overall, this represents an increase from 8 to 10 bookable meeting rooms and to 426 m^2 (4,685 ft^2) of bookable meeting and event space, and meets the expanded need envisioned as resulting from expanded student group-related activities.

The plan also anticipates the possible use of one of these spaces as a multi-purpose, studio-style facility appropriate for audio and video production.

3.3.4 Retail Space

Bookstore

The University Bookstore is a key anchor in SUB and is a hybrid of leased space and University controlled space. The renovation proposes that 270m^2 (2,906 square feet) of Lower Level space currently leased to the Bookstore be repurposed towards the goals of the renovation. While this will require some internal reorganization within the store, this creates an opportunity to improve the Lower Level storefront. The corridor immediately adjacent to the south boundary of the bookstore will be reserved to accommodate tills and queuing during the highest volume weeks in fall and winter.

SUBprint

SUBprint is a full service printing facility offering a comprehensive range of products. In addition to producing the vast majority of custom courseware at the University, SUBprint offers retail services to members of the University and surrounding community. A forefront location in the Lower Level will facilitate a shift to higher emphasis in the retail arena, a strategic priority for the business.

The proposal increases SUBprint space slightly, and maintains access to the Bookstore and the freight elevator.

SUBtitles

SUBtitles primarily sells used textbooks on consignment and also offers eco-friendly products and general merchandise. We propose converting the space it occupies into offices and meeting rooms and merging the existing business with SUBmart on the Main Level. The SUBmart-SUBtitles combination has previously operated successfully and a return to this model adds assignable square footage to the project scope. Textbook consignment will continue and other product lines will be consolidated with those of SUBmart, where work is currently being done to increase product density and remove low-turnover products.

Added Commercial Retail Units

Two to three new commercial retail units are envisioned – one is to be a food and beverage operation and the other is yet to be determined, with the possibility of a kiosk also under examination. The food and beverage operation will have limited cooking facilities and will not provide for an exhaust canopy. This will allow a diversification of the services provided by the building while buffering the financial impact of the project and contributing to the operating costs of the building. The units are given a direct interface with lounge space to maximize their commercial viability and convenience for building occupants. The inclusion of retail space contributes to our intent to reproduce the success of the Main Level atmosphere on the Lower Level.

3.3.5 Other SUB Tenants

University Chaplains

The Chaplaincy unit is proposed to relocate from its current home on the Lower Level to the 3rd Floor (the spaces are currently allocated to Students' Union Elections and Students' Union Technical Support, both being relocated to the 6th Floor and Lower Level, respectively). The program is achieved with the inclusion of a meeting room, two private office/consult spaces, a small kitchenette, and a large meditation space equipped with separate ablution facilities. While the intended space does address immediate concerns, notably with respect to ablution facilities, it is not intended to solve the issue of peak-period prayer space demands identified in the 2010 General Space Program. Currently, peak-period Muslim prayer services are being accommodated in the Van Vliet Centre.

CJSR

CJSR FM 88.5 will retain its address on the Lower Level, but is reduced slightly in area in order to allow for a larger allocation space for the adjacent student group offices hub. While the 2010 General Space Program anticipates a need for additional space, ex-post needs and program assessments/consultations have confirmed that a reduction in contiguous space is feasible.

Building Services

The mission of Students' Union building services is to provide a welcoming environment for students and staff by maintaining a clean, well run building with a variety of businesses, services, and relaxation opportunities.

In order to meet this mission, adequate storage spaces for equipment must be provided. The renovation proposal maintains current storage allocations, which are sufficient to be able to provide the excellent level of custodial and maintenance services enjoyed by building users to date.

Additional washroom space is provided as part of the project, including a gender-neutral family washroom.

Students' Union technical support is proposed to move adjacent to the meeting room cluster in the northeast corner of the Lower Level. Power and network requirements are considered for this space. This allocation will meet the long identified needs for their program, notably with regard to temperature and power requirements for equipment.

Table 2: Functional Space Analysis

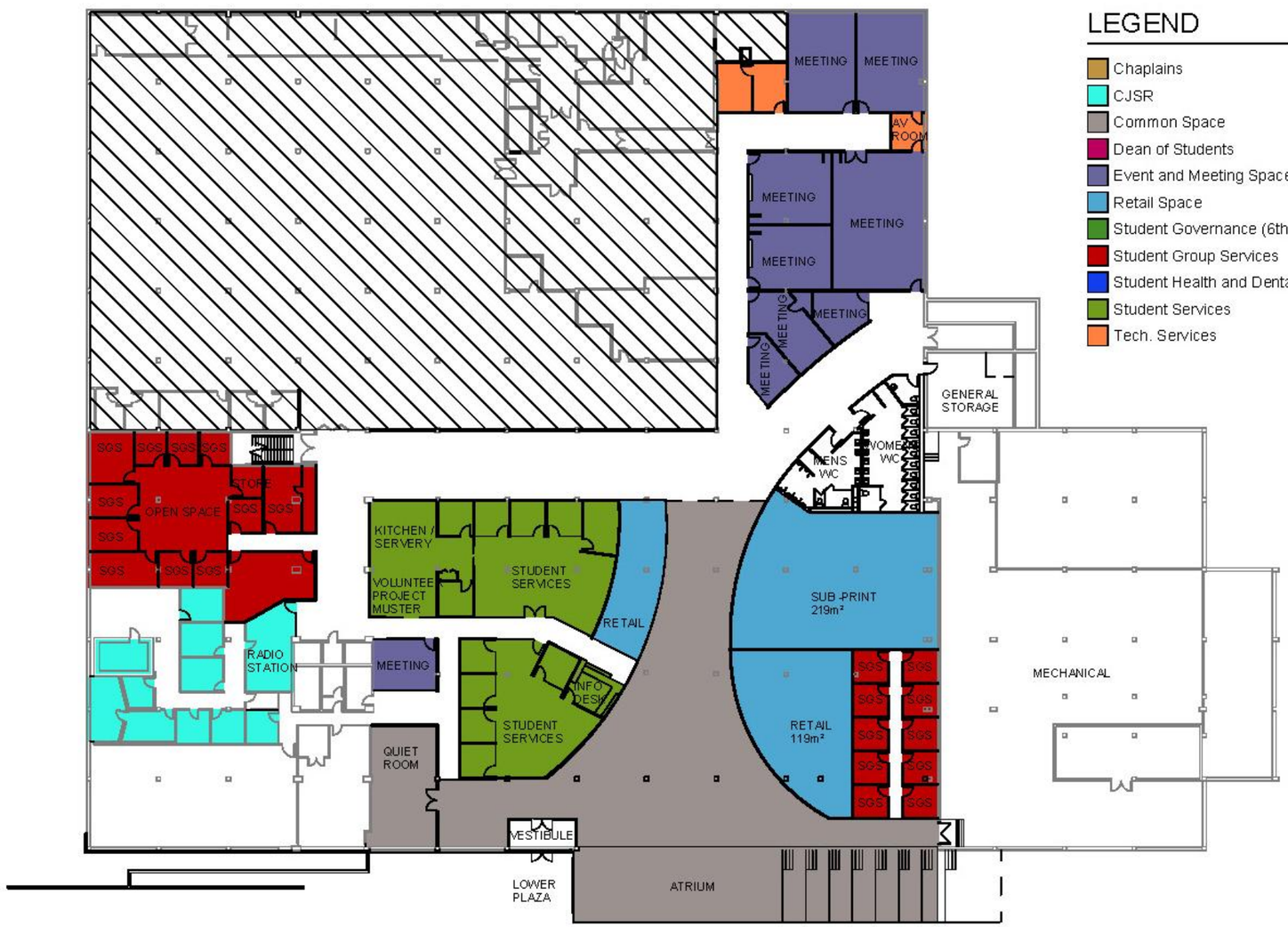
Function	Component	Current Location	NASM	Proposed Location	NASM	Notes
Student Services	**All components**		**376**		**520**	
	Students' Union Services	*Lower Level*	298	Lower Level	345	*Bike Library excluded*
	Student Governance	*Lower Level*	47	6th Floor	152	
	Health and Dental Plan	*Lower Level*	31	6th Floor	23	
Student Group Spaces	**Group Offices**	**Lower Level and 6th Floors**	**277**	**Lower Level**	**323**	
Common Space	**Study, social and relaxation space**	**Main and Lower Level**	**246**	**Lower Level**	**704**	*Includes Quiet Lounge*
Event & Meeting Space		**Lower Level and 6th Floors**	**280**	**Lower Level**	**426**	
Retail Spaces	**All components**		**3562**		**3211**	
	Bookstore	Main and Lower Levels	3086	*Main and Lower Levels*	2816	
	SUBprint	Lower Level	211	Lower Level	219	
	SUBtitles	Lower Level	266	Main	0	*Merged with SUBmart*
	Added Retail	Lower Level	0		119	
Other Tenants	**All components**		**352**		**299**	
	University Chaplains	Lower Level	182	3rd Floor	133	
	CJSR	Lower Level	170	Lower Level	166	
Building Services	**All components**		**17**		**25**	
	Storage and service	No changes				
	Technical Services	3rd Floor	17	Lower Level	25	

Current Net Assignable Square Metres based on actual usage. Excludes circulation space.

Legend

NASM = Net Assignable Square Meters

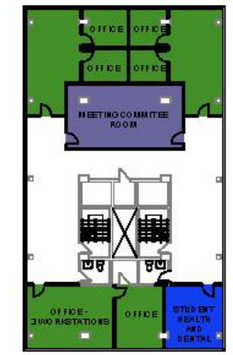
01257E0200 – April 9, 2013



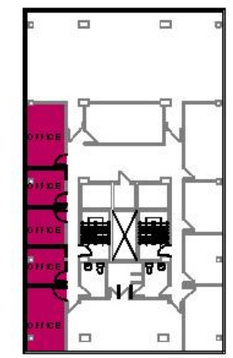
LOWER LEVELS

LEGEND

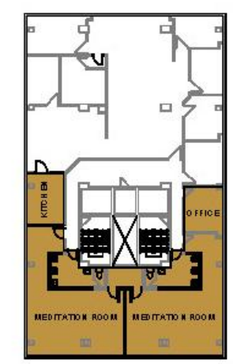
- Chaplains
- CJSR
- Common Space
- Dean of Students
- Event and Meeting Space
- Retail Space
- Student Governance (6th Floor)
- Student Group Services
- Student Health and Dental
- Student Services
- Tech. Services



6TH FLOOR



4TH FLOOR



3RD FLOOR

TOWER LEVELS

FUNCTIONAL SPACE LOCATIONS

3.4 Exterior Construction Assemblies

The materials and construction assemblies selected for this project reinforce the classic modern lines inherent in the existing structure and provide for a durable, energy efficient building envelope of "institutional quality".

3.4.1 Typical Exterior Construction Assemblies

Roof Assemblies

R1 Atrium Roof

- Gravel Ballast
- Roof Barrier/Slip Sheet
- RSI 5.26 Board Insulation
- Roof Membrane [Fully adhered EPDM]
- 16mm Gypsum Sheathing
- Structural Steel Roof Deck and Framing

R2 Canopy Roof

- Gravel Ballast
- Roof Barrier/Slip Sheet
- Roof Membrane [Fully adhered EPDM]
- 16mm Gypsum Sheathing
- Structural Steel Roof Deck and Framing

Glazing Systems

G1 Atrium Enclosure

- Triple Glazed Sealed Units with Thermally Enhanced Spacers
- Stainless Steel 'Spider' Connection
- Intermediate Laminate Glass Finn

G2 Infill Glazing

- Double Glazed Sealed Units with Thermally Enhanced Spacers
- Thermally Enhanced Aluminum Curtain Wall Frame

Foundation Cladding

- 100mm Cast in Place Architectural Reinforced Concrete Cladding
- 75mm Board Insulation
- Air/Vapour Membrane
- Existing Concrete Foundation Wall

Column and Beam Cladding

- 100mm Architectural Precast Concrete Cladding
- Air Space
- 40mm Board Insulation
- Air/Vapour Membrane
- Existing Concrete Column or Beam

Upper Canopy Fascia and Soffit

- Prefinished Composite Aluminum Panel System – Vented
- Engineered Steel Stud Framing System - Galvanized

3.4.2 Glazing Detail at the Terrace and Lower Plaza

The glazing detail at the exterior/ interior tiers is designed to minimize a complex step pattern at the glazing and enhance the visual experience of the tiers extending from the exterior into the building's interior. In order to simplify the glazing installation, a thermally broken recessed slope in has been introduced between the building's interior and exterior. This slope is stepped at the glazing joints to minimize complex glass shapes. The recessed slope is 200mm wide on each side of the glazing to ensure the slot can be easily flushed and the glass panels easily accessed. It is vertically offset between the interior and exterior to eliminate the potential for infiltration. A glycol heating loop is provided in the slot and around the trench drain at the bottom of the steps to prevent freezing and provide for free flowing rain and melt water.

Pilkington Planar triple glazing or a similar comparable product is specified for the atrium glazing. The laminated tempered glass assemblies used in this product offer superior impact resistance when compared to conventional curtain wall glazing systems. The glass will not break when subject to normal conditions and moderate to heavy force impact.

3.5 Interior Finishes

Generally the interiors will be completed to an institutional level of quality. The following table provides a general list of materials and finishes that will be incorporated into the new interiors.

Table 3: Interior Design Finishes

Description	Floors/ Base	Walls	Borrowed Lights/Doors	Ceilings
Lower Level				
Student Lounge Space	P-CT-PC	GB	N/A	ACT/ GB
Work/ Project Rooms	SV/ R	GB/MW	WD/ MF	ACT
Meeting Rooms/ Offices	CPT/R	GB/MW	WD/ MF	
Retail Spaces	NIC	GB	NIC	NIC
Level 3 and Level 6	CPT/R	GB	WD/ MF	ACT

Legend

P-CT	Porcelain- Ceramic Tile floor and base (Slip resistant)	PC	Polished Concrete
		WD	Wood Doors
SV	Sheet Vinyl	MW	Mobile walls between meeting rooms
R	Rubber Base		
GB	Gypsum Bd. Painted	MF	Metal Frames
ACT	Acoustic Ceiling Tile	NIC	Note in Contract
CPT	Carpet Tile		

Enhanced finishes and detailing that includes materials such as porcelain tile, wood paneling and integrated seating is provided in the main student space on the Lower Level. The tiered seating area and the atrium floor will be finished with polished concrete.

3.6 Building Code Review

The purpose of this building code review is to review and determine changes to fire, life safety and plumbing on the Lower Level and to identify the additional measures, if any, required to accommodate the proposed design within the existing building, particularly the interconnection between the Main Level and the Lower Level. The Authority Having Jurisdiction is the University of Alberta which in turn has contracted The Inspections Group Inc. to achieve compliance. The applicable building code is the 2006 Alberta Building Code. This review is based on the understanding that the renovations undertaken in 1993 and 2002 significantly upgraded the fire and life safety measures. In those renovations, a new exit stair compliant to current standards was added to the east side of the facility. The existing open stair, north of the existing elevator core, that serves the Lower Level, Main and 2nd Floors was separated from the remainder of the floor areas it serves and an exit corridor to the exterior was established.

3.6.1 Lower Level

Table 4 lists the Lower Level occupied areas and the occupant load associated with each area as determined under ABC 3.1.17.1. In practice these occupant loads will rarely, if ever, be attained. Table 5 lists the exits that serve the Lower Level, their width and the exiting capacity listed as persons. This table demonstrates that the exiting capacity provided in this table exceeds the calculated occupant load provided in Table 4.

Table 6 provides the minimum number of water closets required. For the purpose of calculating water closet requirements ABC Table 7.2.2.6.B has been applied to the new occupant load.

Table 4: Lower Level Occupant Load

Description	Area (SM)	Area/ Person	Total Occupancy (people)
Office	583.0	9.3	63
Retail	2001.2	3.7	541
Meeting Rooms	431.0	1.85	233
Lounge Areas	733.5	1.85	396
Service	2209.0	46	48
Net Building Area	5957.7		1281
Gross Building Area	6651.0		

Table 5: Lower Level Exiting Requirements			
Description	**Width (mm)**	**Width / Person (mm)**	**Total Exiting Capacity (People)**
Lower Level Entrance	2700	6.1	443
N.E. Stair	2100	8.0	263
North Stair	940	9.2	102
West Stair	2400	8.0	300
Tower Stairs	1880	9.2	204
Total Exiting Capacity			1312

Table 6: Lower Level Plumbing Facilities			
Gender	**No. of People**	**Fixtures Required**	**Fixtures to be Provided**
Males	640	8	8
Females	640	10	11
Family Washroom		0	1

In terms of new water closets over existing, this represents a 120% increase for females and a 33% increase for males. It also provides new barrier free fixtures and 2 ablution [foot wash] sinks for both genders, and a non gender "family washroom" equipped with change table.

Interconnected Floor Space

When the existing light wells were roofed over in 2002, what had been an exterior area became interior space. These spaces are now classified as interconnected floor spaces under the terms of the building code. Interconnected floor spaces that only connect two floors do not require any onerous measures, particularly as the existing glass windows provide for a smoke separation.

With this design, however, three floors become interconnected: the Lower Level, the Main Level and the 2nd Floor. Three storey interconnected floors require more stringent and costly measures including: mechanically vented smoke control systems, the creation of areas of protection or additional exists from all floor areas.

The least costly approach is to provide new sprinkler lines with individual sprinkler heads at each 2nd Floor window in the existing light wells. The Authority Having Jurisdiction has accepted the introduction of sprinklers in conformance with Standata 06-BCV-010 "Sprinkler-Protected Glazing in Fire-Resistant Wall Assemblies."

3.7 Construction Sequence

This section briefly describes the approach and phasing to the construction of this project including interior renovations and the new addition.

The first phase of construction is anticipated to include minor renovations on Floors Three, Four and Six so that the functions so identified in Table 2 can be relocated from the Lower Level prior to construction commencing on that level. During this phase, which is expected to occur between May and August of 2013, demolition for the Lower Plaza and the atrium foundations will commence. The balance of the work including the construction of the superstructure and the interior fit up is anticipated to commence in July of 2013 and be completed by the 3rd quarter 2014.

The Lower Level interior fit out will occur in three phases. The first phase includes the student groups on the west side of the floor and modifications to the bookstore's lower level, the second phase includes the balance of the floor south of the bookstore, and the third phase includes the meeting rooms in the northeast corner. SUBprint will remain operational in its existing location until the end of the second phase and will be moved to its new location prior to commencing the third phase.

On the Main Level the areas that will be affected by construction are the quiet lounge; the existing south perimeter adjacent to the new addition, including the front entrance; and the opening in the floor adjacent to the bookstore. A horizontal dust hoarding will be provided at the opening. The quiet lounge will not be temporarily located elsewhere during construction. A construction hoarding offset approximately 2m will be provided adjacent to the south perimeter. During the construction period the west pedestrian entrance to the Stadium Parkade walkway will be maintained and a temporary emergency exit through the former quiet room will be provided.

On the Lower Level a construction hoarding will be provided in the Bookstore and in CJSR's space. CJSR will also be provided with a temporary access to the west stair in the tower core. Student Groups and Student Services will be temporarily decanted from the Lower Level to other areas in SUB. The new SUBprint space will be completed before the existing area is demolished so that decanting this function is not necessary.

The excavation of the lower plaza level requires shoring to maintain continued access along the 89 Ave. ROW south of SUB. This will accommodate, access to loading facilities for SUB and the Administration Building, the PAW and University Hall construction project sites, and DATs access to the Steadward Centre.

3.8 Sustainability

The Students' Union is committed to incorporating sustainable design into the 2012 Addition and Renovation. A specific project goal of the March 2012 referendum is: *"Minimize the environmental footprint of Students' Union operations."* There are a number of nationally and internationally recognized standards against which sustainable projects can be benchmarked. These include LEED-CI [Commercial Interiors], "Green Globes" and its affiliated Canadian program administered through the Building Owners and Managers Association "BOMA Best". In general these programs focus on the following key areas:

- Reduced energy and water consumption
- Reduced emissions and effluent
- Increased recycled content
- Reduced waste in both initial construction and continued operations
- Improved indoor environmental quality in terms of air quality, thermal comfort, and minimized glare
- Increased natural daylighting
- Improved energy management systems

In order to maximize the construction budget, it was agreed that this project would not include a formal registration and certification process incorporating one of these standards but that the principles these programs embody would be incorporated into the project where feasible.
The sustainable features incorporated into this project include:

- Energy Management Strategies designed to reduce overall energy consumption including natural ventilation to reduce summer cooling, radiant heating to produce effective warmth close to the user, and radiant cooling to reuse chilled water that may not be fully utilized in the building, improving power plant chiller operation and efficiency. Upgrades to air handling units include addition of variable speed operation of the fans to reduce air volumes and fan power at partial loads.
- Maximizes daylight penetration into the Main and Lower Levels in the student activity areas.
- Daylight/ occupancy sensors to control the use of electric lighting during daylight hours and when spaces are not occupied.
- Energy efficient lighting and outdoor lighting that is night sky friendly.
- Enhance building envelope for the atrium. The options that are being explored here include: triple glazing, frameless glazing to reduce perimeter heat transfer; low 'e' coatings; gas filled cavities and ceramic frits to reduce solar heat gain.
- High albedo roof finish to reduce solar heat gain.
- New washroom facilities in the Lower Level equipped with low flow fixtures, hands free operation and high efficiency hand dryers instead of paper towels.
- Maximizing the use of materials that are recycled, locally sourced or sustainably produced.
- Avoiding the use of any materials that emit volatile organic chemicals (VOC's).
- Diverting construction waste to recycling facilities and programs

In addition to these measures the Students' Union is contemplating a number of operational changes incorporating zero or minimal waste systems. These include:

- Mechanical strategies to reduce heat loss through food court/kitchen exhaust.
- Reduce the amount of disposal materials used in food court operations.
- Provide sustainable, environmentally-friendly housekeeping products and practices.
- Implement an education/feedback program that inform students and helps them gauge the extent to which their choices are sustainable.
- Continue programs developed through Sustain Students' Union.

4. LANDSCAPE DESIGN

The landscape schematic design developed here is consistent with the Schematic Design Plan. This plan will be further refined in consultation with the Students' Union and the University of Alberta and will be presented in detail to FDC at a later date.

The intent in the overall landscape design is to connect as seamlessly as possible with the environs, and to do so in a way which respects the long-term landscape planning for the University. This means taking into consideration the eventual extension of the 89th Avenue promenade and SUB's interface with surrounding buildings, particularly the PAW Centre.

The Lower Plaza and landscape treatment is developed as an extension of the Lower Level. The Lower Plaza area has a stairway to the east along with tiered landscape levels to the east end which brings the Lower Level up to the Main level. The west end slopes out, back to existing grade.

There is approximately a four metres elevation change between the 89th Avenue access road across the front of the building and the lower Plaza level. The grade change is taken up with three grade changes. The grade changes are developed as sloping planters.

The planters themselves are filled with decorative flowering shrubs and perennial grasses. Accent locations are left within the planters for color by annual plantings.

The face of the building is proposed with a planter concept as well, protecting the glass façade. Mass plantings of flowering shrubs will fill the planter beds.

An area is set aside for the placement of a couple of BBQ's with gas connections to complement the functions in the courtyard area.

Within the floor plan of the Plaza there is a row of deciduous trees, (Brandon Elm proposed) to carry through the existing formal tree planting that exists to the east along 89 Avenue.

The six tiers grade change on the east side of the Plaza is proposed with drought tolerant fine fescue sod overplanted with micro clover. Micro clover does not grow very tall, is very fine in texture, requires minimum cutting, can take heavy abuse, and fixes nitrogen back into the soil, fertilizing the fescue grasses.

Pedestrian activity on the terraces is encouraged and this combination of grasses should withstand the pedestrian use.

The Plaza surface treatment is proposed with some banding of a slight color or texture change. The bands are proposed with a rectangular paver stone to compliment the contemporary, clean lines of the building and glass atrium. The pattern lines would be further developed as a permeable paver to introduce water back into the soil and enhance the watering of the Plaza trees.

Simple stainless steel inserts within the Plaza concrete are also proposed to provide anchor points for tents or table shades, umbrellas that would occur during registration, breakfast or market garden events.

A drip irrigation system such as "Netafim" tubing, is proposed for on top of the shrub bed soil, just below the bark mulch bed cover. These tubes drip water by gallons per hours so the water supply requirement is very low. This system conceals the lines, does not waste water, and can operate 24 hours if required. The same can be done within the turf tiered terraces as the lines are placed at the 150 – 200mm depth, bottom of the topsoil, and then pulse operated to feed water to the roots of the grass from below.

The overall Landscape Design is a clean and simple treatment. Broad brush strokes of mass shrub plantings, in concert with the simple and clean lines of the architecture.

5. STRUCTURAL DESIGN

5.1 Introduction

The purpose of the Structural Design Development Report for the proposed Students' Union Building is to:

- Present the schemes considered for the structural systems of the facility and make recommendations based on comparisons,
- Provide the architectural, mechanical, and electrical consultants with information that will allow the design of the facility to progress, and
- Provide the Construction Manager and Cost Consultant with information for project costing.

This report contains a summary of the structural design criteria, a description of structural components and should be read in conjunction with reports prepared by the other design disciplines.

The structural information presented is under development and will be revised and supplemented to satisfy functional and architectural requirements, to accommodate the needs of the mechanical and electrical disciplines, and meet cost objectives as the project proceeds.

5.1.1 Structural Selection Criteria

In selecting structural systems for the facility as the design develops, the following will be considered:

- **Safety** Design loads have been selected that are appropriate for the use and occupancy of the building. The structural systems will be designed to provide safe use for staff and visitors.
- **Integration of Building Systems** The configuration of the structural members and lateral load resisting elements will be coordinated closely with the mechanical and electrical systems to provide an efficient and compact integrated building system.
- **Adaptability** Over the years, the needs of the Students' Union Building tenants will potentially change and the interior building layout will need to be modified. The structural systems chosen will allow for future changes to the building layout.
- **Value For Money** Preference will be given to structural systems that provide economy for the project as a whole, taking into account the interdependence of costs between the architectural, structural, mechanical, and electrical system.
- **Durability and Long-Term Maintenance Costs** Structural materials will be selected that are robust and durable to reduce ongoing maintenance costs, particularly in areas exposed to public view.
- **Vibration and Noise Control** Preference will be given to framing and floor systems that limit vibration. Systems minimizing noise transmission will be given preference over systems that do not.
- **Structural Serviceability** The potential for excessive structural deflections or movements will be carefully evaluated and controlled to within limiting values.
- **Appearance** Exposed structural systems are intended to form part of the architectural approach to the design. Careful consideration will be given to the appearance of the structure in these areas.

5.2 Design Criteria

5.2.1 Codes

Structural systems for the facility will be designed in accordance with the Alberta Building Code 2006 and the NBC Structural Commentaries (Part 4 of Division B).

Structural components and materials will be proportioned in accordance with the requirements of the following codes:

- CSA A23.1-09/A23.2-09 Concrete Materials and Methods of Concrete Construction/ Methods of Test for Concrete
- CSA A23.3-04 Design of Concrete Structures
- CAN/CSA S16-09 Limit States Design of Steel Structures

5.2.2 Design Gravity Loads

Ground floor and roof areas will be designed for the following gravity loads:

Basement and Main Floor Areas:

- Live General Assembly Areas 4.8 kN/m2
  Corridors / Stairs 4.8 kN/m^2
- Superimposed dead (finishes) 0.25 kN/m2
- Concentrated live
  Typical Floor 9 kN

Low Roof:

- Live
  Roof *4.8 kN/m^2

** Low roof structure rated for assembly loading to allow for potential future access*

- Superimposed dead
  Ceilings and Services 0.50 kN/m^2
  Extensive Green Roof Allowance **3.0 kN/m^2

*** Low roof structure rated for potential future addition of 150 mm thick extensive green roof **or** 150 mm gravel covering on un-occupied inverted roof*

- Basic Snow and Rain
  (plus snow drifting and rain ponding) 1.5 kN/m^2

High Roof:

- Live 1.0 kN/m2
- Basic Snow and Rain
  (plus snow drifting and rain ponding) 1.5 kN/m^2
- Superimposed dead, typical 0.5 kN/m^2

The superimposed dead loads noted above include allowances for weights of ceilings, services and other finishes.

The Code requires that an Importance Category be assigned to the structure based on the intended use and occupancy as shown in Alberta Building Code Table 4.1.2.1 (see below). The Students' Union Building will be designed assuming that the building is of "Normal Importance", being classified as a building not likely to be used as a post-disaster shelter and not containing hazardous substances in large quantities.

Table 4.1.2.1: Importance Categories for Buildings
Forming Part of Sentence 4.1.2.1.(3)

Use and Occupancy	Importance Category
Buildings that represent a low direct or indirect hazard to human life in the event of failure, including: • Low human-occupancy *buildings*, where it can be shown that collapse is not likely to cause injury or other serious consequences • Minor storage *buildings*	Low(1)
All *buildings* except those listed in Importance Categories Low, High and Post-disaster	Normal
Buildings that are likely to be used as post-disaster shelters, including *buildings* whose primary use is: • As an elementary, middle or secondary school • As a community centre Manufacturing and storage facilities containing toxic, explosive or other hazardous substances in sufficient quantities to be dangerous to the public if released(1)	High

Post-disaster buildings are *buildings* that are essential to the provision of services in the event of a disaster, and include:
• Hospitals, emergency treatment facilities and blood banks
• Telephone exchanges
• Power generating stations and electrical substations
• Control centres for air, land and marine transportation
• Public water treatment and storage facilities, and pumping stations
• Sewage treatment facilities and *buildings* having critical national defence functions
• *Buildings* of the following types, unless exempted from this designation by the *authority having jurisdiction*(2)
  ○ Emergency response facilities
  ○ Fire, rescue and police stations, and housing for vehicles, aircraft or boats used for such purposes
  ○ Communications facilities, including radio and television stations
	Post-disaster

5.2.3 Lateral Loads from Wind and Earthquake

Lateral loads for the building are typically transferred back into the existing structure. Lateral load resisting elements to facilitate this transfer, will be designed using the following parameters:

Wind:

- Reference velocity pressure, 1 in 50 probability of being exceeded in any one year — 0.45 kN/m^2
- Importance factor for ultimate limit state — 1.00 (Normal Importance)

Earthquake:

- 5% damped spectral response acceleration, expressed as a ratio to gravitational acceleration

Period, T (s)	Spectral Acceleration $S_a(T)$
0.2	0.12
0.5	0.06
1.0	0.02
2.0	0.01

- Importance Factor — 1.0
- Structural configuration — Regular
- Site class — D
- Seismic Force Resisting System

- Structural steel, conventional construction
  - Ductility-related force modification factor — 1.5
  - Overstrength-related force modification factor — 1.3

5.2.4 Deflections

Horizontal components of the structure generally deflect downward as a result of gravity loads. Excessive vertical deflections can create concerns, including cracking or crushing of non-structural components, lack of fit for doors and windows, out-of-plumb walls, and water ponding.

Structural members will be sized to limit deflections that occur after the attachment of non-structural components, including deflections due to live or snow load. Live load deflection limits used in the design are tabulated below in Table 1, expressed as either an absolute value or as a ratio of span length:

Table 1 : Live Load Deflection Limits	
General Structural Steel Roof Members	
Perimeter, smaller of	20 mm 1:480
Interior	1:300

Long span beams and girders will be cambered by an amount equal to the anticipated dead load deflection of the member. The intent is for the structural members to be relatively flat and level in the long-term under dead loads and to improve the aesthetic appearance of the structure where exposed. The project specifications provide guidance for construction tolerances to prevent the risk of "built in" slopes and skewed members.

5.2.5 Vibration

Due the nature of the proposed building, there are no suspended internal structural steel floors for which vibration due to walking excitement and human activity is an issue. Also, roof structures are also typically not analyzed for this type of vibration as the vibrations are not felt by occupants sensitive to these movements.

5.2.6 Fire Rating

Structural fire rating is not required for single storey steel structures that support only a roof (no intermediate floors or mezzanines) in accordance with current standards.

5.3 Construction Materials

5.3.1 Material Strengths

The following materials are proposed for the construction of the Students' Union Building:

- Concrete, conforming to CSA-A23.1-09, made with Type HS cement as summarized in **Table 2**:

Table 2: Concrete Strength and Exposure Class

Application	28 day strength (MPa)	Exposure Class
Concrete Piles	30	S3
Grade Beams (Ext. / Int.)	35/30	C1/N
Slabs on grade (Ext. / Int.)	32/25	C2/N
Masonry Core Fills	20	N

- Grade 400 deformed bar reinforcing steel conforming to CAN/CSA-G30.18-09
- Structural steel conforming to CAN/CSA-G40.20/G40.21-04, grade 350W for W-shapes and hollow structural sections, grade 300W for other structural shapes and plate
- Metal decking conforming to the requirements of CAN/CSA-S136-07

5.4 Geotechnical Issues and Foundations

5.4.1 Geotechnical Investigations, Environmental Investigations and Reports

A geotechnical report has been prepared by Thurber Engineering Ltd. entitled "Proposed Students' Union Building Addition - Desktop Geotechnical Evaluation" dated September 24, 2012. An addendum technical memorandum has also been prepared to provide further clarification dated September 26, 2012. These reports have been reviewed and findings are summarized in the following sections.

The typical soil profile at the site is thought to consist of surficial fill overlying galciolacustrine clay and silt layers overlying glacial clay till overlying re-worked sand and gravel overlying bedrock. Groundwater on the site is identified as being below 4.9 m below ground level.

5.4.2 Foundations and Grade Beams

Foundation Options

The recommended foundation systems presented in the geotechnical report are cast-in-place concrete piles, continuous flight auger (CFA) piles and steel helical piles. Strip or spread foundations have been found unsuitable for in-situ ground conditions.

Cast-In-Place Concrete Piles – Cast-in-place concrete piles are installed by augering to a pre-determined depth, withdrawing the auger, placing reinforcement and filling with concrete. Soils at the site are prone to collapse, therefore steel casing of all piles is anticipated. The pile resists vertical loads through skin friction between the pile and the soil. Cast-in-place concrete piles are very common in Alberta and require a lesser degree of skilled labour when compared to other foundation options noted below.

Continuous Flight Auger (CFA) Concrete Piles – CFA piles are installed by augering to a pre-determined depth and pumping concrete through the central stem of the auger while it is withdrawn from the hole. These piles are generally suitable through poor quality soils with the potential to collapse with traditional auguring. The resulting pile resists vertical loads through skin friction between the pile and the soil. The installation of these piles requires a skilled rig operator to prevent soil collapse or even de-compression of the ground due to over-augering. 400mm or 600mm diameter piles are typically preferred and 25 m is a generally accepted maximum depth. It should be noted that there are a limited amount of contractors able to perform this type of work, resulting in a potential for higher costs.

Steel Helical Piles (Screw Piles) – Helical piles consist of circular steel plates (helices) welded to a central hollow steel tube. A specialist rig is used to auger the pile into the ground, typically to a pre-determined depth unless otherwise specified (on-site resistance monitoring). Screw piles resist vertical loads through direct bearing of the helix plates on the soil.

Foundation Recommendations

Having reviewed the proposed solutions, we would recommend that the CFA piles and traditional cast-in-place concrete piles both be considered as foundation solutions for the proposed building. The option of using screw piles has been considered and would not be recommended in this case.

Screw piles have been historically used for lighter loads and for structures less sensitive to settlements and movements. There is a deficiency in information regarding the long-term performance of this pile type and its long-term settlements. Due to this, the fact that they are supported on un-even soil stratas across the site, and the potential corrosion of the helices, we would suggest these be disregarded as a foundation alternative.

Due to the CFA piles and cast-in-place concrete piles being both viable solutions, we propose preparing foundation drawings showing pile diameter and depth. Drawings will indicate that both installation methods are feasible and acceptable to the consultant, allowing the contractor to select their preferred and most cost effective solution. The drawing would also include a performance specification, limitations on suitable systems and design criteria.

A pile supported concrete grade beam will be provided around the entire building perimeter to support loads from the envelope. Void form is required below all grade beams to resist forces from frost heave and clay swelling.

The proposed foundation layout can be found on drawing S2.0.

5.4.3 Concrete Floor Slabs

Main floor slab will be constructed as a combination of grade supported slabs and suspended structural slabs on grade. New slabs at the basement level will be 150mm thick normally reinforced slab on grade.

Slabs forming part of the raking stair and platform system at the east side of the addition will be formed using structural slab on grade supported by grade beams and piles. This is recommended over a slab on grade solution due to anticipated poorer quality of soils at higher levels.

The atrium slabs will contain in-floor heating pipes which will be cast into the concrete. Coordination will be a consideration in executing this work properly. Details will be developed in close coordination with the mechanical engineering team to promote a functional and constructible design.

The geotechnical report identifies zones of high plastic clays which are prone to swelling and shrinking in response to variations in moisture content. Slab movements of up to 30mm are predicted. Due to architectural restrictions, slabs will be tied in at all perimeter grade beams, with additional reinforcement provided to control cracking in the case of the above movements being realized.

The proposed main floor structural layout can be found on drawing S2.02.

5.4.4 Landscaping Structure

The proposed architectural vision for the landscaped area to the south of the addition includes a significant amount of concrete structures including slabs, retaining walls, stairs and planters.

Al external slabs at the existing basement level which do not form part of the earth retaining system will be 125 mm thick normally reinforced slab on grade. Slabs will be sloped away from the addition structure towards area drains.
In order to accommodate the final grading arrangement at the site, retaining walls are required along the south perimeter of the building. These retaining walls will effectively replace the existing foundation walls in separating the road grade from the basement level.

A traditional concrete retaining wall system is being used and consists of a vertical reinforced concrete wall designed to cantilever from the base. The base structure will consist of a continuous concrete structural slab on grade approximately 3m wide. The structural slab will restrain the wall against overturning, and will act as a support for planters and stairs.

Soil retention systems will be designed using an appropriate lateral loading to represent the in-situ soils and heavy traffic loads from the adjacent road. During construction of the retaining walls, the proximity to the adjacent 89 Avenue should be closely considered. Temporary shoring may be required and should observe appropriate deflection limits in order to avoid damage to road structures and buried services.

The stepped platforms and stairs outside the south-east corner of the addition will be formed with reinforced concrete. Raking concrete beams will form the edges of the exterior structure with concrete beams and slabs spanning between these supports to form the individual platforms. All platforms and stairs will be supported on piles to prevent excessive movement and to reduce the amount of cracking. The exterior concrete retaining walls will be isolated at the interface with the interior structure to prevent thermal bridging.

5.5 Superstructure

5.5.1 Existing Building Structural Systems

Existing drawings prepared by B. W. Brooker Engineering Ltd., dated September, 1965 have been reviewed. Information on subsequent refurbishments and renovations were not available for review. No inspections of the existing building have been performed at this time.

The existing building consists of a 2 storey concrete frame on a single level basement. A central tower structure rises from the centre of this lower structure, but does not interface with the proposed development and is therefore outside the scope.

The framing system at the main, second and roof levels consist primarily of concrete joists spanning between concrete girders. The girders are supported by concrete columns and, in less frequent cases, by concrete shear walls and foundation walls. Building columns are typically on a 6.1m x 6.1m grid and are supported by concrete piles below basement level. Foundation walls are also supported on concrete piles. It is not clear from the drawings what type of concrete pile construction was used.

The Lower Level floor consists of a concrete slab on grade of varying thicknesses ranging from 125mm to 150mm. At the interface with the addition, the basement slab is recessed 175mm, presumably due to a historical usage of this space. As part of the refurbishment, a 175mm concrete topping will be installed to bring this up to a common basement level.
Stability for the building is presumed to be provided by the concrete shear walls, which typically form stair and elevator core walls within the building. Perimeter foundation walls could also form part of this system although this is not anticipated. This will need to be further investigated during the contract documents phase to determine if the proposed alterations to these walls have any effect on the lateral load resisting system.

Loads resulting from snow, wind and rain ponding on the new and existing structures will be assessed on each roof level. Snow drift loads may exert lateral pressures on the existing building at the low roof level. We anticipate that the drifting will be minimal and that the wall system will be well capable of withstanding these loads. At the new canopy roof level, no new snow drifts are anticipated as there are no new vertical faces for the snow to drift against. The addition of the canopy may slightly change some snow load patterns, but is not anticipated to adversely affect the existing structure or subject it to loads for which it was not designed.

The proposed superstructure layout and details can be found on drawings S2.03, S3.01 and S5.01.

5.5.2 Lateral Load Resisting System

It is anticipated that lateral stability of the addition will be provided by the lateral load resisting system of the existing building. All lateral loads will be transferred to the existing building without the use of traditional braced frames. Moment frames will be used to transfer lateral loads from the new high roof structure down to the existing concrete roof structure.

Lateral loads from wind and earthquake will be transferred through the roofs using the diaphragm action of the steel decking. The deck and the respective deck joints will be designed to transfer the lateral loads through the plane of the roof to the moment frames or to the existing structure.

5.6 Costing

In determining overall building cost estimates from the information presented in this report and on the drawings, appropriate allowances should be made for atypical geometry, heavily loaded areas, and special framing required to suit the functional requirements of the other disciplines.

Cost estimates should include allowances for the following:

- The forming of mechanical and electrical rooms and openings/sumps on the basement floor, including pads, curbs and so forth
- Special framing around mechanical and electrical shafts and risers
- Cast-in supports and pockets for exterior cladding, glazing, mechanical equipment/louvers
- Exterior structures such as retaining walls, planters, walks, curbs, and so forth not detailed on structural drawings
- Exterior structural slabs, aprons and canopies adjacent to entries
- Potential increased pile depths due to unanticipated soil conditions
- Penetrations for mechanical and electrical services
- Sloped roof steel at 2%
- Fall Arrest posts
- Complexities associated with installing in-floor heating tubes in structural and non-structural slabs on grade
- Shoring required at the excavation so that 89th Avenue remains open during construction
- Roof access ladders/stairs

5.7 Closure

The structural systems for the Students' Union Building have been developed to be functional, economical, and responsive to the architectural requirements for the building within a framework of environmental sustainability.

In the Design Development phase, the emphasis of the structural work has been on developing the structural design criteria, developing framing systems and coordinating closely with the design team and the client. As work progresses through the contract documents phase, we will continue to work closely with the client, the project manager, and the rest of the design team to improve and refine the design of the building.

6. MECHANICAL DESIGN

6.1 Summary

This section outlines the Mechanical Design for the new University of Alberta Students' Union Building (SUB). Mechanical systems have been further developed during Design Development based on updated architectural drawings and meetings with both the Students' Union and University of Alberta Facility and Operations Staff. Investigations of the existing systems and ceiling space continue and will be ongoing during working drawings.

6.1.1 Code and Code-Referenced Standards

The following are applicable codes, and standards that are referenced by those codes. The requirements of these codes and standards will be met by the mechanical design.

- Alberta Building Code – 2006
- Alberta Fire Code – 2006
- ANSI/ASHRAE 62.1- 2010; Ventilation for Acceptable Indoor Air Quality
- NFPA 10-07; Standard for Portable Fire Extinguishers
- NFPA 13-07; Standard for the Installation of Sprinkler Systems
- NFPA 14-03; Standard for the Installation of Standpipe and Hose Systems

6.1.2 Standards and Guidelines

The following publications are accepted standards and guidelines of good engineering practice. These recommendations contained in these standards will generally be adhered to in the mechanical design.

- ANSI/ASHRAE 55-1982 Thermal Environmental Conditions for Human Occupancy.

6.1.3 Design Criteria and Standards

Heating and cooling load calculations are based on the 2006 Alberta Building Code and ASHRAE Handbook of Fundamentals.

The design conditions for the spaces within the main floor and Lower Level will be:

Winter:	Outdoor Temp:	-34°C DB; Elevation: 645 m
	Indoor Temp:	19°C to 23°C DB (fixed setpoint in common areas)
	Indoor Humidity:	25% RH above 0°C
	Indoor Humidity:	17% RH below 0°C
Summer:	Outdoor Temp:	28°C DB/19°C WB; Elevation: 645 m
	Indoor Temp:	19°C to 23°C DB (fixed setpoint in common areas)
	Indoor Humidity:	25% RH Maximum

Outdoor Air: Outdoor air requirements for ventilation will be based on the most stringent requirements of ASHRAE 62.1 – 2010. The mechanical design will accommodate the ventilation and cooling required for code occupancy expected in each space.

The design conditions for the proposed Atrium will be:

Winter:	Outdoor Temp:	-34°C DB; Elevation: 645 m
	Indoor Temp:	19°C to 23°C DB (fixed setpoint in common areas)
	Indoor Humidity:	25% RH above 0°C
	Indoor Humidity:	17% RH below 0°C
Summer:	Outdoor Temp:	28°C DB/19°C WB; Elevation: 645 m
	Indoor Temp:	19°C to 23°C DB (fixed setpoint in common areas).
	Indoor Humidity:	25% RH minimum, maximum below 60% RH (dehumidification not provided)

Outdoor Air: Outdoor air requirements for ventilation will be based on the most stringent requirements of ASHRAE 62.1 – 2010. The mechanical design will accommodate the ventilation and cooling required for code occupancy expected in each space.

The outside air requirements for the atrium and Lower Level area will be based on the maximum allowable occupancy of the Lower Level spaces, current maximum occupancy is 1,281 people.

The SUB building air systems are controlled centrally and operate from 7 am to 11 pm.

6.2 Plumbing Revisions

6.2.1 Pipe Rack Revisions

The desired ceiling height is 3,150 mm in the Lower Level adjacent to the atrium to maximize light penetration. An existing pipe rack interferes with this ceiling height, and retaining the pipe rack would require a large bulkhead with the underside 2,684 mm above the floor. This will create a major obstruction to the light penetration from the atrium. Relocation of the piping rack will involve demolition of approximately 25m of existing pipe rack and re-routing to a higher elevation. The relocation of the piping rack will allow the ceiling space to be increased by approximately 466 mm. The relocation of these lines for a higher ceiling space will be a major coordination item since very large piping is involved. There are two 200 mm chilled water supply and return pipes, a 200 mm sprinkler line, all the heating and domestic water lines for the tower, and a large storm and sanitary line.

The piping demolition will include asbestos abatement and a major shut down for SUB as some of the lines serve the upper floors and tower. Each pipe will have to be researched, the impact to SUB operations determined, and a shut-down scheduled. University of Alberta staff will have to be engaged to perform all drain and refill of existing systems. Adequate drains and air vents will have to be incorporated if the pipes are not self-venting, particularly if the piping creates a high point. The relocation work will have to be performed during the summer to minimize disruption to the tower, and minimize risk to the building in cold weather. The new routing has been designed to minimize the amount of work that must be done. Several of these existing pipes have also been determined to be redundant such as drinking water recirculation and can simply be demolished.

6.2.2 Domestic Water

Existing domestic water will be modified to suit the new washroom layout and new retail food areas in the Lower Level. The washrooms are being upgraded to meet increased occupancy loads therefore main domestic line capacities will be confirmed. The drinking water lines from the mechanical room have been decommissioned and will be demolished. Tenant domestic water connections will be provided.

6.2.3 Storm Drainage

The atrium addition will add to the net roof area of the Students' Union Building. Water collecting on the top canopy will be directed to the existing roof with scuppers and splash pads. Standard roof drains will be added to collect any rain that collects on the lower canopy. Drainage will be connected to the existing storm system in the main floor ceiling space and connected to the nearest riser. Existing rooftop drain and rainwater leader capacities will be confirmed during the contract document phase. The existing as-built drawings and storm lines were evaluated and the results were inconclusive, a detailed roof survey will be required when the roof is cleared of snow.

An existing 250mm storm main leaves the Lower Level on the SW corner approximately 1,200mm above the Lower Level slab level. A civil site survey of existing manholes was performed during Design Development to determine the invert location of this storm main. However, the survey was inconclusive since the existing branch line could not be located in the street manhole. The storm line was traced through the existing building as-built drawings and this storm line must connect to one of these manholes, most likely the manhole referred to as Manhole #2. This manhole has a connection point that could lead to the building, this is currently being confirmed by a locator survey.

The shallow storm manhole invert will require re-routing of this existing storm main due to the lower elevation of the final plaza elevation. The storm drainage from the plaza cannot be drained overland directly to the lower roadway grade. Therefore, the storm drainage from the plaza will need to be controlled by area drains. Two area drains will provide some redundancy in case one drain becomes blocked, and an overland drain relief line is being investigated. Separate leads will be provided for each area drain and a frost box if the required cover cannot be maintained. The intent at this time is to re-route the existing 250mm storm main and the new area drains to a manhole down the hill to provide the required cover. The Civil consultant is currently investigating these requirements and working to alleviate concerns about flooding of the plaza.

It is assumed that the existing Lower Level has weeping tile and new weeping tile will be extended around the new perimeter atrium behind the retaining wall.

6.2.4 Plumbing Fixtures

The existing Lower Level washrooms are being upgraded to provide additional plumbing fixture counts. This will require a complete new layout of the washrooms, so all plumbing fixtures in the Lower Level washroom will be replaced with new high efficiency water conserving fixtures.

Water closets will typically be wall hung with in-wall carriers, flush valves type, with infrared sensors c/w manual override. There will be three water closets in the men's washrooms and 11 water closets in the women's washrooms. Urinals to be flush valve type, high efficiency, infrared sensors c/w manual override, with approximately four urinals installed. Urinals will require a cleanout directly above the urinal with a 150 x 150mm stainless steel access plate with security screws. New lavatories will be wall hung with in-wall carriers, with a single handle manual fixture. There will be approximately 10 new lavatories in the Lower Level washrooms. All infrared fixtures will be hard wired.

Tenant water connections will be provided in the retail spaces for potential plumbing fixtures.

6.2.5 Sanitary Drainage

Existing under-slab sanitary drainage will be modified to suit revised plumbing fixture locations in the revised Lower Level washroom layout. Inverts and slopes will be confirmed, but the new washrooms are in approximately the same location and no problems are foreseen. The main sanitary line exits the building on the north east side of the building. A line running along the south wall in the Lower Level ceiling space will be adjusted to fit within the new proposed bulkhead.

A 100mm underground sanitary connection will be provided for the new tenant spaces for future sink connections.

6.3 Central Heating System

6.3.1 Primary Source

Existing steam to hot water heat exchangers provide hot water for radiation, force flows, and unit heaters. Reheat coils will be added to the variable air volume boxes in the Lower Level to provide minimum air volumes in the space and supplementary heating where required. The capacity of the existing Lower Level hot water and reheat heat exchangers is to be verified during detailed design, but currently an upgraded heat exchanger is anticipated. The heat exchanger will be increased in size if required and will not be doubled up, this will allow use of existing control infrastructure.

There are existing radiant panels along the main floor overlooking the atrium. These will be deleted where there is no longer a perimeter zone. Radiant panels adjacent to the perimeter will continue to provide comfort to students.

Zoned hot water radiant tubing is proposed for the new atrium slab on grade at the Lower Level and in the tiered interior seating. The nature of the atrium space precludes a concern about re-zoning or re-purposing this area, therefore the atrium slab is suitable for an in-floor radiant system. The in-floor radiant heating in the interior seating will increase the appeal of the stairs to become a student gathering area in the winter months by improving thermal comfort. The radiant system was separated into two zones, one for the main lower slab and one for the tiered interior seating. This will allow control of each zone separately and prevent overheated or overcooled seating areas.

There are overhead doors in both ends of the new atrium space that may allow additional air leakage. The design and selection of the overhead doors will provide a low leakage design with a better R-value. The radiant floor loops will utilize a variable temperature, constant volume design to keep hot water flow moving within the slab to minimize the risk for freeze-up. In addition, radiant floor loops will be kept away from door openings. This will allow the use of hot water instead of glycol. The heating slab temperature will be controlled to prevent discomfort, typically no greater than 29.4°C.

Pumps and controls for the radiant slab system will be provided in the mechanical room. The existing MCC panel is being replaced and moved, freeing up space along the south west wall of the mechanical room for this equipment. The new Atrium slab will also require below grade insulation and slab edge insulation to allow the radiant heating to operate efficiently.

Perimeter radiation is proposed along the perimeter walls of the atrium for supplemental heat. Radiant fin piping will be installed in a 4" high free-standing enclosure between the columns. Warm air will rise by convection preventing frost and aiding to cover envelope losses. Adequate supplemental radiation will be provided to keep the atrium space warm without utilizing the air systems.

The proposed mechanical system supplying the radiant slab will be circuited as shown in the mechanical schematic drawing. The proposed system will take advantage of lower supply temperatures needed for the radiant slabs by using hot water return mains. This will allow the use of existing primary heating pumps without increasing the existing pump size.

6.3.2 Glazing Study

A glazing study was performed to determine the impact of double glazing, triple glazing, and triple glazing with PV cells and/or frit on the energy use. The following is a comparison for heating:

Glazing Option	Annual Heating Load	% Saved	Peak Heating Load
Double-Glazing	453 MMBH	-	173 MBH
Triple-Glazing	408 MMBH	10%	158 MBH
Triple-Glazing PV or Frit	397 MMBH	12%	158 MBH

The triple glazing provides more efficient heating performance due to the increased R-value. The interior surface temperature of the triple glazed product will also provide a warmer surface and reduced undesirable radiant cooling effect. The net energy savings will be about $350-400 per year for the triple glazing option, which unfortunately is not a substantial savings.

6.3.3 Vestibule and Overhead Door Heating

Local vestibule cabinet heaters or air curtains will be provided to offset infiltration heating loads through the new entry vestibules at both the main floor and in the Lower Level. If the heating units have to be located above the vestibule ceiling, the potential use of horizontal discharge ducts will be evaluated to provide better distribution. The overhead doors will have additional local heat, and the intent is to provide a well sealed overhead door type that will only be opened during warm weather events.

6.4 Cooling System

6.4.1 Glazing Study

A glazing study was performed to determine the impact of double glazing, triple glazing, and triple glazing with PV cells and/or frit on the energy use. The following is a comparison for cooling:

Glazing Option	Annual Cooling Load	% Saved	Peak Cooling Load
Double-Glazing	139 MMBH	-	195 MBH/ 9570 cfm
Triple-Glazing	127 MMBH	9%	178 MBH/ 8760 cfm
Triple-Glazing PV or Frit	106 MMBH	24%	137 MBH/ 6726 cfm

The triple glazing provides more efficient cooling performance due to the increased shading coefficient, but more savings are attributable due to shading of the glazing by the frit. The fritting option could also be applied to the double-glazed option, this would provide substantial savings in cooling load as well. The net energy savings will be about $600-650 per year for the triple glazing option. The fritting of the glazing provides a substantial decrease in cooling load that is typically reflected in a smaller air handling unit, smaller chiller, and reduced terminal unit and diffuser sizing. However, the majority of these costs cannot be saved due to the use of existing air handling units.

6.4.2 Building Distribution

Chilled water for the University of Alberta Students' Union Building (SUB) is supplied by the University of Alberta Central Plant. There is sufficient capacity in the chilled water system and air handling systems to accommodate the new cooling loads.

The new atrium is substantially constructed with glazing and is facing South. This creates a high cooling load in the new atrium and it was desired to lower the net solar load in the space. The use of external shading devices, imbedded shading solar PV panels, and fritting was investigated for the impact on the cooling load. It was determined that approximately 30% coverage of fritted glazing will be added to the glass to reduce solar heat gain and to provide some glare control.

The existing linear slot diffusers that run along the current south perimeter wall on the main floor will remain and assist with cooling of both the main floor and the atrium. The slots will be adjusted to change the distribution pattern into this space.

6.5 Ventilation System

6.5.1 Air Supply – General Description

The Lower Level space being renovated is currently served by two air handling units, designated as the Curling Unit and the Bowling Unit. Additional air handling units serve other basements spaces as well. Constant volume boxes with reheat coils were installed on a few branches during the club offices renovations. Variable air volumes terminal units were installed in a couple of areas; however the main unit fan was not upgraded with variable speed control. When the VAV boxes reduce the air volume to a space, the system pressure changes and air is redirected into adjacent spaces. The VAV boxes provide more control but don't reduce fan energy.

All constant volume boxes will be replaced with VAV terminal units in the Lower Level and zone control will be provided. A separate project being done by the University includes adding VFD's to the majority of the existing air handling unit fans. The static pressure sensor for VFD control will have to be located in the ductwork and wired back to the controller for the VFD.

The load calculation model was utilized to determine the energy and cost saving potential associated with upgrading the existing constant air volume (CAV) systems with a variable air volume (VAV) system. The existing building is served by two (2) CAV units with total capacity of 17,597 l/s (37,300 cfm) that supply a constant volume of air to all spaces throughout the year.

The air volume supplied to each specific room is calculated based on peak heating/cooling load, and is maintained constant during the operation of HVAC system. The supply air needs to be initially cooled to 12.8 C (55 F) and distributed within the building, and then is reheated to desired supply temperate depending on instantaneous room loads. This requires year round supply of peak load-dominated air volume even during off-peak hours at which a lower volume of air could meet the loads and provide comfortable indoor conditions. A VAV system, however, could reduce the air volume so that zone-level re-heating of air is minimized. Reducing the total air flow would also decrease the cooling coil load as well as fan energy.

Whole building energy simulation indicates the Lower Level area and the atrium require 8,983 l/s (19,112 cfm) to meet the loads with a VAV system while a CAV system would require a total capacity of 14,098 l/s (29,871 cfm) to maintain comfortable indoor conditions. The existing CAV system, however, is currently running at 17,597 l/s (37,300 cfm) which is significantly higher than what is required. The table below compares the energy and cost associated with three different scenarios:

- CAV system to run at full capacity of 37,300 cfm (existing condition)
- CAV system to run at reduced capacity of 29,871 cfm which requires balancing of the unit
- CAV system to be utilized with variable speed drives to act as a VAV running at 19,112 cfm at peak condition

	Heating energy (MWh)	Percent saved (%)	Cooling energy (MWh)	Percent saved (%)	Fan energy (MWh)	Percent saved (%)	Annual energy cost ($)	Percent saved (%)
Scenario 1 (base case)	899	-	78	-	92	-	40,232	-
Scenario 2	565	37%	33	58%	64	30%	25,162	37%
Scenario 3	320	64%	27	65%	52	43%	16,002	60%

- Utility rates used in the calculations are obtained from University of Alberta district plant and are as follows:
  - Steam at $20.88/1000 kg which corresponds to 3.2 ¢/kWh
  - Chilled water at $0.34/m3 which corresponds to 4.2 ¢/kWh
  - Electricity at 8.9 ¢/kWh (ENMAX)
  - Operating hours for the air handling units of 7 am – 11 pm.
- The results show that balancing the existing CAV system to run at a lower capacity would save about $15,000 per year. Utilizing variable speed drives would result in an additional $9,000 saving per year.
- Assumptions:
  The indoor conditions are maintained between 19°C and 23°C
  Outdoor ventilation air is supplied at a rate required by ASHRAE 62.1-2010
  Outdoor conditions based on Alberta Building Code 2006

A bulkhead is being added along the gridline A to allow for air to be distributed through linear grilles into both the atrium and the open Lower Level space. At times when the overhead doors are open, cross ventilation will occur and the VAV box serving the atrium will be turned off for energy savings. The interior VAV boxes will continue to operate to serve their respective zones.

6.5.2 Air Supply Equipment

Two units serving the renovated basement area have been studied – the Curling/Club offices with a capacity of 10,613 L/s (22,500 cfm) and the Bowling/Games unit with a capacity of 6984 L/s (14,800 cfm). These units currently have chilled water cooling coils, humidification sections, and roll filters. The Curling unit was upgraded with a new cooling coil in 2008. A common mixed air plenum serves all eight units in the basement mechanical room. A May 2011 report by ReLumen Engineering noted that the mixing dampers for all air handling units should be replaced to provide better mixing conditions, particularly if the common outside air/return air duct is revised to outside air only. All of the existing air handling units have been upgraded with new outside air and return air dampers.

6.5.3 Air Supply Unit Replacement

Two units serving the renovated Lower Level area have been studied – the Curling/Club Office and Bowling/Games Unit. It was found during Design Development that several components have already been upgraded to a greater extent than previously assumed. The university is replacing the main MCC panel and adding VFD's to most of the air handling unit fans. The Bowling and Curling unit are among those changed and will be able to support a full variable volume system with the new VAV boxes. The return air and outdoor air dampers on all units have also been replaced. The cooling coils on the Curling unit have also been replaced. Therefore, the existing air handling units can be utilized to service the new SUB upgrade with the retrofits completed to date. Further upgrades to the main air handling units can be performed in the future when required.

6.5.4 Natural Ventilation

It was determined during design development that the original concept of natural ventilation was less viable due to the reduced height of the atrium space. Therefore, the concept of openable vents at low and high levels was abandoned. However, there is still a possibility to use natural ventilation by utilizing the two overhead doors, which will provided a substantial natural cross-flow draft. The intent would be to provide a digital contact to each overhead door to confirm opening. This signal would disable cooling to the area and allow natural ventilation and air movement to cool the space.

6.5.5 Existing Relief Louver

The west exhaust louver on the south wall of SUB was investigated during schematic design to see if it could be partially covered. The louver was found to be completely inactive and all the exhaust for the building exits through the east exhaust louver. The building operator noted that the building is now short of relief air capacity in full economizer mode. The reduced volume operation of the new VAV units will assist in relieving excess pressure.

6.5.6 Air Supply and Cooling – Tower Building

The scope of work in the existing tower building is small in nature and the mechanical upgrades will consist of a tenant retrofit. This will involve moving existing HVAC zones and sprinkler heads as required to suit the new layout. A separate study was conducted to determine the scope of potential overall upgrades for the Tower induction units, but the cost associated with these upgrades is outside the scope of this project.

6.5.7 Humidification

Direct injection steam humidifiers are installed in the existing air handling units. SUB Print requires a humidity level of 30-60% for its equipment and print quality, a supplemental in-space humidifier will be provided for this space.

6.6 Fire Protection and Life Safety Protection

Sprinkler coverage will be required at the top of the atrium. New horizontal sidewall sprinkler heads will be installed at a high level in the atrium in lieu of pendant heads at the very top, this may require a code variance. The sprinkler heads can meet the extended distance. Sprinklers within the Lower Level will be adjusted as required to suit the new layout.

Hand held extinguishers will be provided throughout in compliance with NFPA 10 and local authorities.

All ducts and piping passing through a fire separation will be provided with fire stopping in accordance with the building code. Any ducts passing through a fire-rated wall will be provided with an approved fire damper.

It was noted during a site visit that the fire department's Siamese connection was located in the corner of the bay adjacent to the proposed new main entrance. This may need to be adjusted based on architectural design.

The interconnection of the floor spaces only consist of the Lower Level and the main floor, so dedicated smoke exhaust will not be required. The second floor interconnection will be isolated from the main floor by a fire rating and sprinkler heads at the glazing.

6.7 Control Systems

6.7.1 General

An extension of direct digital control (DDC) building management system (BMS) will control and monitor all mechanical equipment and will provide zone HVAC control. Currently SUB is equipped with an Invensys automatic control system, the original RCMS system and Honeywell Tritium server.

It is intended that the terminal boxes in the zone, and new radiant cooling and heating equipment be upgraded to DDC control. All leftover control pneumatics within the space shall be identified. The existing air handling units use an in-house system which can have points added to them for any new controls. A new end of duct pressure sensor will need to be added to each unit to control variable speed drive speed. All mechanical room control shall utilize the original RCMS system.

Space temperature control will be provided through terminal controllers, electronic room temperature sensors, and electronic reheat and heating control valves.

Standalone remote control panels will operate and monitor major mechanical equipment.
All field devices including valve and damper actuators, room temperature controllers, and HVAC system and equipment control and monitoring devices will be electronic.

7. ELECTRICAL DESIGN

7.1 General Description

This report outlines the proposed power distribution, lighting, fire alarm and communication systems for the proposed Students' Union Building (SUB) Renovation. The electrical capacities and systems described in this report are based on our interpretation of the program requirements developed to date.

The electrical system design will be in accordance with the requirements of the Canadian Electrical Code, the Canadian Standards Association, the Illuminating Engineering Society (IES), regulations of the local inspection authorities having jurisdiction, and University of Alberta requirements.

All new electrical construction shall be complementary to the SUB base building design and more recent upgrading/renovation methods. The standard of work is to be equal or better than that of the building. Any additions and/or changes to the existing systems are to be made using equipment identical to that already used in the SUB.

The electrical systems work shall include but not necessarily be limited to the following:

- **Power Service and Distribution**

- Power service to the renovation area from the existing SUB network
- Normal power distribution (120/208V) equipment
- Emergency power distribution equipment
- Wiring and connection of all mechanical equipment
- Power wiring to all architectural systems including hand dryers, power assisted doors, etc

- **Lighting**

- Renovated area lighting including emergency and exit lighting
- Renovated area lighting control
- Exterior plaza lighting
- Street lighting

- **Fire Alarm Devices and Verification**

- In conjunction with proposed University fire alarm system upgrade program

- **Data and Communications**

- Conduit and cable tray infrastructure and structured network cabling for telephone and high-speed internet
- Multimedia television distribution
- Conduit, cable tray and/or wireway system for distribution of data, internet, and telephone
- Meeting rooms' data, telephone, and multimedia infrastructure
- Wireless communication

- **Communications and Security**

- Security and access control
- CCTV

- **Architectural, Structural and Mechanical Coordination**

- **O & M Manuals**

7.2 Sustainability

Through the electrical design, there are several contributions that can be made to the sustainable design of the facility. The most noticeable will be the incorporation of occupancy controls to turn lights off when the space is unoccupied. Daylighting will be incorporated into the lighting design, where available, utilizing controls to minimize or eliminate electric lighting when sufficient daylighting exists to illuminate the space.

Exterior lighting will be designed to comply with dark sky standards.

Low-power lighting, primarily T-8 fluorescent, will help contribute to the overall reduction in energy usage, while proper switching and lighting control contributes to the controllability of systems, along with providing improved building operation.

7.3 Power

7.3.1 Power Distribution – Normal-Power Panels

(refer to a partial normal-power single line following)

General Intent and Notes

The intent with respect to power distribution in the renovation area is to re-use existing circuits where possible. There are panels on the periphery of the area, in the Mechanical Room, and in the Electrical Vault. The panels' locations, existing breakers, and spare capacity, when combined, appear to make the re-use concept workable, the only caveat being obsolescence of the panels (and, therefore, lack of supply of new breakers for them).

The labelling of panels and CDP's throughout the building appears to be a mixture of single-letter alphabetical and the more logical ordinal-number/floor-level nomenclature. There appears to be duplication of some panel designations, which leads to confusion without forensic-level study. We intend to rationalize this nomenclature scheme during this project, at least in the Lower Level, especially since we intend to have all receptacles labelled by panel and circuit. The University has indicated that this is its intention also, and will provide panel-identification information.

There will be some 600-volt work to be done in the Mechanical Room, most of which will involve connecting new motors that will be replacing existing ones.

Existing Panels' Re-use and Required New Panels

The new SUBprint area will require a panel to replace its existing north-end 42-circuit **Panel H**. While Mechanical-room **Panels B1D and B1DA** are back-to-back with SUBprint's new area, they have only a few spare breakers between them, so will find application to SUBprint only by exception. The directory of **Panel F** (southwest corner of Mechanical Room) shows it largely connected to what will become the Meeting Room area. It could be considered for SUBprint's new panel, pending the disposition of Panel H (Meeting Rooms or new north-end IT Technical room).

The existing SUBprint area, in addition to Panel H, has an original **Panel B1C** that will have to be relocated or have its circuits taken on by other panels. Of particular note is that it has a 100A breaker feeding an **unnamed 30-circuit panel in 012A**, a distant office in the south side of the Bookstore, north of the west stairs. Examination of the panel in 012A revealed 17 circuits used, including a 60-amp 3-pole breaker. Therefore, it is likely that this panel will need reconnection, presumably from relocated Panel B1C, with a certain amount of pre-planning in case it powers important outlets in the Bookstore. It has no directory, so breaker-by-breaker testing will be required to determine what it feeds.

Panel K, a 42-circuit panel beneath the west stairs, appears to be perfectly suited to handle the area's northwest lineup of student offices, and possibly beyond.

Panel B1A (42-circuit), fed from **CDP 1D2**, is in Janitor's Room 006. It also has circuits going into the west area and into the central area, so what Panel K cannot cover due to circuit count or recommended distance, B1A will handle.

- B1A's directory shows only one spare breaker space, but also shows the use of 10 mini-breakers, giving it a distribution of 46 circuits. B1A appears to have a companion 42-circuit **Panel B1B**, fed from **CDP 1D4** in the Mechanical Penthouse. B1B's 2003 directory shows all but four breaker spaces used, with eight of them having mini-breakers, plus a 70A3P breaker, giving it effectively 48 used circuits plus four spaces. B1B's directory gives no indication of breaker disposition. We do not recommend using circuit-splitting mini-breakers.

  If B1A is insufficient to power north Student Common and the east-west main corridor to the west stairs (particularly lighting), Panels B1D and B1DA should certainly be able to contribute circuits. These two do not have completed directories.

The new Technical Room (data-switches and servers) and an adjacent technician's workroom will require a new panel, size to be determined. Possibly, nearby **Panel H**, discussed previously, can serve the new room. Panel H will be relocated either to the new Technical Room or a few metres south into the new east-west corridor in order to serve the meeting rooms.

CDP **1D1** has a spare 200A breaker, which will be used supply the central retail area. It also has a 200A breaker ostensibly serving "Ceramics" in a room B150, unknown at this time.

Panels F and **G** are in the southwest corner of the Mechanical Room. Panel F's directory shows it largely connected to what will become the Meeting Room area. It could also be considered for SUBprint's new panel.

Panel F's directory also indicates that it feeds a new panel (named **SU1)** in the Bookstore's Microstore, an area that will be demolished and be replaced with the Reception and Workstation area. Panel SU1 is currently located on a column in the north centre of this new area, and would be moved to one of the new walls. Its feeder conduit would be extended to the new location, and its feeder conductors re-pulled.

Panel G (42-circuit) in the main serves rooms and offices that will disappear, so most of its circuits are available for new disposition. Its location makes it a prime candidate for supplying the new atrium and plaza lighting and power.

There is also a **CDP SDP2** outside the Electrical Vault that ostensibly feeds a Panel B, near the east stairs, and **Panels F** and **H**, previously mentioned. **Panel B** no longer exists, so its 200A breaker in SDP2 may become available for use if needed.

7.3.2 Power Distribution – Emergency-Power

Panel M1Z (main floor by elevator) supplies emergency lights for the entire building except for those in the electrical vault, mechanical room, and the chaplains' area. Its Lower Level lighting circuits should cover the new configuration.

Panel B1Y (Electrical vault) powers the emergency lights in the electrical vault, mechanical room, and the chaplains' area, as well as the fire alarm panel, generator battery charger, and sundry other receptacles and devices. The panel has spaces, so it can pick up any emergency lights not covered by M1Z.

7.3.3 Power Distribution – Feeder and Branch Conductors

All building wiring, unless noted otherwise, will be 98% conductivity copper with minimum 600 volt insulation. Branch circuit wiring will use #12 AWG as the minimum size conductor. Wiring for data receptacles will have a dedicated ground and neutral wire per circuit. General convenience receptacles and lighting circuits can utilize shared ground and neutral wires. Shared neutrals are to be minimum #10 AWG. Ground wires to be minimum #12 AWG.

7.3.4 Power Distribution – Receptacles

General

Every attempt will be made to colour-coordinate receptacles with wall finishes. Plates will be commercial-grade (nylon). 5-20R configuration ("t-slot") receptacles will be installed. The minimum 12AWG conductors specified for all circuits give the user the ability to refit to the heavier-amperage receptacles at any time. Receptacles' plates' tops are to be 12 in./300mm above finished floor. This permits access to the receptacle (in most cases) even if a desk is placed directly in front of it.

Meeting Rooms

In the meeting rooms, there will be receptacles on all active walls, in floor-boxes, and at SmartBoard/video-monitor-height locations (@ 1800mm+/- above finished floor), with provisions for ceiling-mounted projector where requested. The large meeting room will have 2 floor-box locations preparatory for a long conference table or other special use. In most cases, each meeting room will have one circuit dedicated to it; the large meeting room will have three circuits.

SUBprint

As mentioned before, a new panel dedicated to SUBprint will be provided. Receptacle locations are to be determined, pending SUBprint's machines' layout.

Offices

The west cluster of offices will generally have receptacles on each wall, with a single circuit per office, except for the large one, which will have two circuits. Each circuit will have a dedicated neutral.

The four-workstation island clusters will have one receptacle per workstation, with the two receptacles sharing a single dedicated-neutral circuit.

The central, reception-area offices will each have a single dedicated-neutral circuit serving three non-door-wall receptacles.

Technical Room and Technician's Work Room

Receptacle types and locations in the Workroom will be discussed with the user.

In the Technical Room:

- For rack-mounted equipment, receptacles are commonly installed on the bottom or side of the cable tray that spans the tops of the racks, are of the amperage configuration required, and are often twist-lock type. Vertical or horizontal orientation of these receptacles, and any associated strain-relief, needs to be decided during design.
- The racks contain power bars or power-distribution units (PDU's) sized to accommodate the loads, and with plugs to match the cable-tray-mounted receptacles.

Corridors and Open Spaces

Pending any specific requests, the intent is to provide housekeeping receptacles located at convenient locations and space intervals.

In the Student Common area, pedestal-mounted receptacles will be provided for laptop and tablet charging. Three circuits should be sufficient.

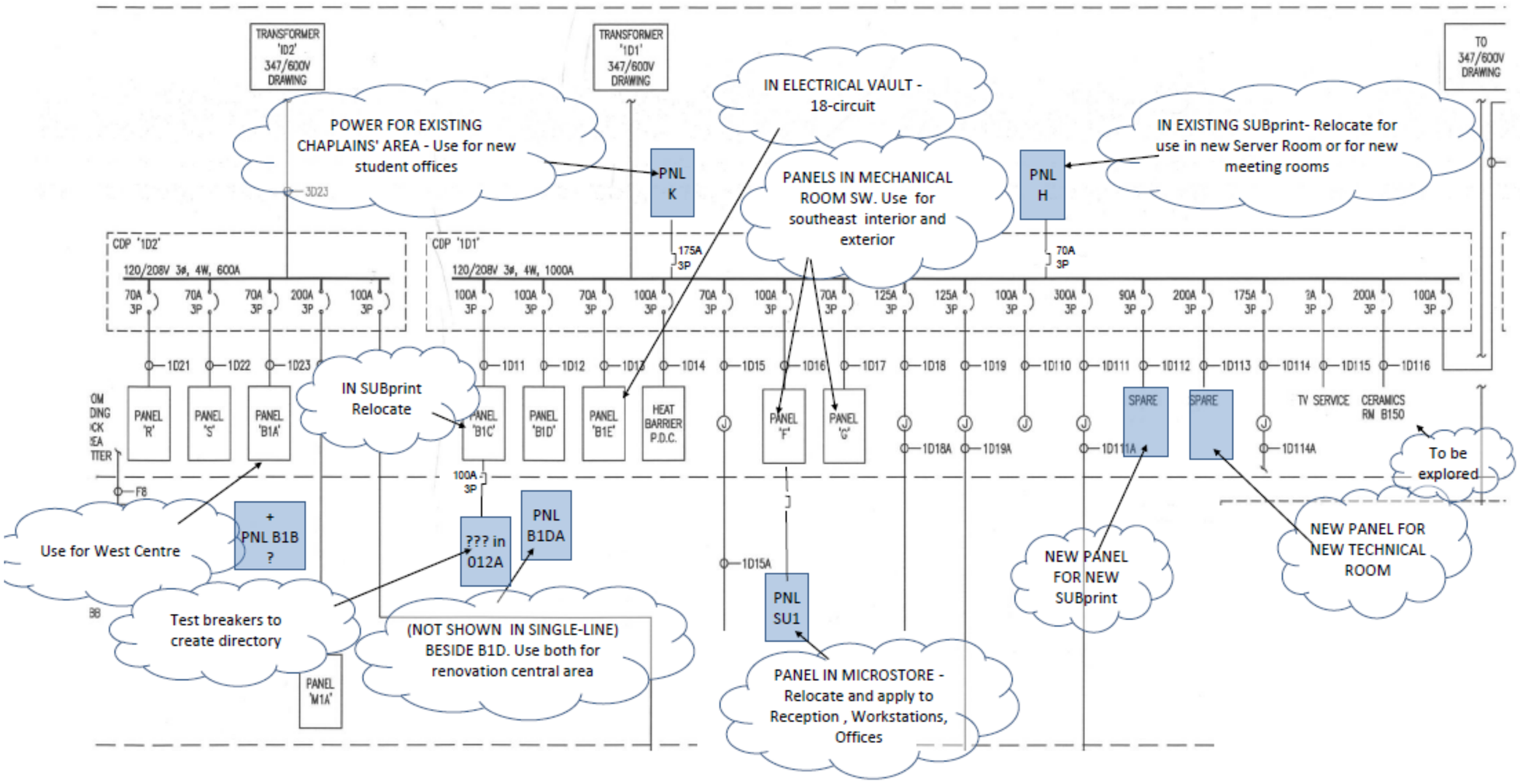
Atrium

The seating risers will each be fitted with two receptacles, again intended for laptop and tablet charging. Again, three circuits will suffice.

There are to be two multimedia points for presentation to audiences on the seating risers. They are to be located along the atrium south wall next to the two columns at the Lower Floor level.

Exterior – Plaza and Planters

Weatherproof receptacles at normal height will be provided along planter walls, primarily. Additionally, outlet(s) will be provided near the north-wall barbecue location.



LOWER LEVEL 120/208V NORMAL-POWER DISTRIBUTION
PROPOSED CHANGES

7.4 Lighting

7.4.1 Lighting Design Parameters and Criteria

Factors for consideration during lighting design include:

- Visual task
- Luminous Environment
- Illuminance
- Luminance
- Energy - consciousness
- Controls

7.4.2 Recommended Lamps

Lamps used will be dependent on the luminaire type, with T8 fluorescents (colour temperature 4100°K) being the preferred standard. LED-equipped luminaires will be provided in special cases, such as where architecturally-selected luminaires come equipped with LED lamps. Where possible, the luminaires will have screw-in lamp sockets for easy replacement of the LED lamps.

7.4.3 Lighting Controls

With increased energy prices one of the main design objectives for this project is energy management. One of the ways to meet this objective is through the use of lighting controls. These control systems assist in maintaining adequate light levels for each specific area and task, whilst providing sufficient flexibility to allow for future changes and offering a means of reducing energy consumption.

A low-voltage lighting control system (Douglas™ as an example) will be provided for the lower-level renovated areas. This will enable the deployment of a considered mixture of manual switching, occupancy sensing, and daylight-harvesting. Where applicable, multi-lamp luminaires will be used in order to provide manual and automatic multi-level lighting. Local dimming will be used only where absolutely necessary, and then only with proven dimming ballasts and compatible controllers

Rooms and areas of intermittent occupancy (washrooms, for example) will be provided with occupancy sensors for lighting control. The sensors will be dual-technology (passive infrared (PIR) and microphonic), and will be set for approximately 30-minute HOLD-ON time to prevent ballasts from premature aging due to frequent switching.

At the newly-glazed south side, to provide energy savings, the lights will be progressively zone-controlled with photo sensors connected to the central lighting control system.

In further-in open areas luminaires will be controlled together and organized into control zones. All the luminaires in a control zone will be locally switched together and are regulated by the central lighting control system.

For the meeting rooms:

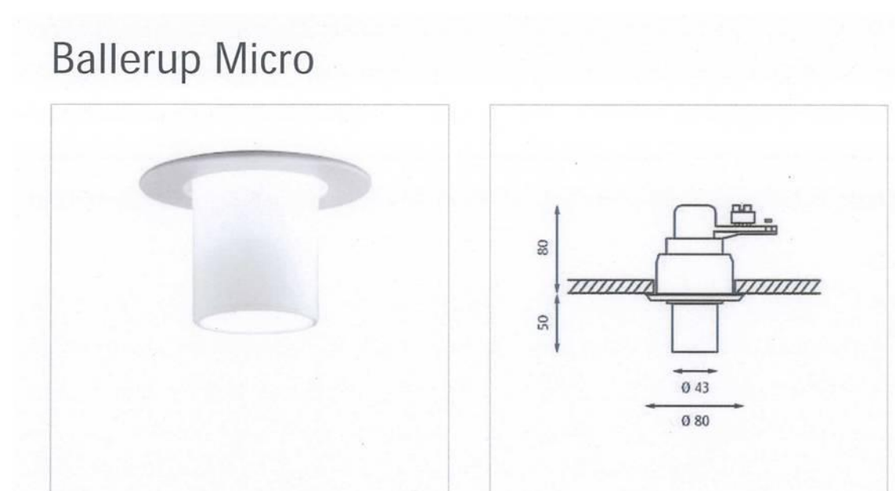
The three-way partitionable meeting space will have a master lighting control and satellite controls with multi-level switching and pot-light dimming for the different configurations this space can take on.

The larger meeting rooms will have typical perimeter + centre zoning of their lights as part of their controls, in addition to multimedia-type zoning.

7.4.4 Interior Lighting

Student Common

The perimeter of this area will be cove-lit. The rest of the ceiling will have semi-recessed luminaires that will also illuminate the ceiling, the intent being to give the space an overall brighter appearance. A possible example is shown below.



Meeting Rooms

Luminaires will be multi-level-lighting 4-foot fluorescents, with dimmable pot lights as a perimeter lighting option for the largest meeting room. The fluorescents will be zoned to provide back-end-only lighting during video presentations.

Student Offices, and Reception-Perimeter Offices

Will typically be lit 1' x 4' multi-level recessed fluorescents.

Reception, Workstation Area

Suspended direct/indirect luminaires will be used in this area.

Hallways, Corridors – North (meeting-room) and West (student offices)

Will typically have 4-foot fluorescents.

East-West Hallway north of Reception, Workstation Area

The wide hallway leading to the west will have LED cove lighting and ceiling pot lights or the semi-recessed luminaire type designated for the Student Common area, since the two areas do flow together.

7.4.5 Exterior Lighting

Street Lighting

Existing street lamps will be relocated, and any additional matching ones required will be sourced from the University stock of those replaced by the new University-standard Lumark Ridgeview LED models.

Plaza Lighting

The exterior sunken plaza is considered a program space, intended to host events for which there may be specific lighting needs. The Students' Union will control and maintain the lighting in this area. Final selection and placement of plaza lighting solutions shall be done jointly by the university and the Students' Union.

Exterior Stairs' Lighting

The stair handrails will have internally-mounted asymmetrical-distribution LED/driver units ("LEDpods") illuminating the stair steps.

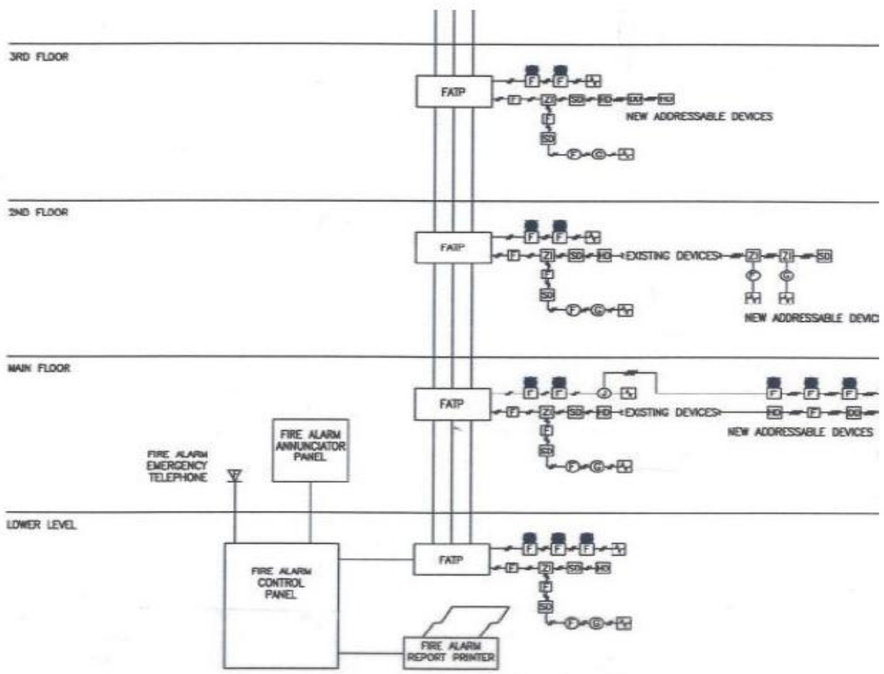
They are an award-winning design by Klik Systems, Australia, noted for their ease of installation and replacement, but remaining theft-proof at the same time. They have been specified for the shared-use-pathway rails alongside the new City of Edmonton Walterdale Bridge.

STAIR HANDRAIL LIGHT

7.5 Fire Alarm System

The existing SUB fire alarm system will be reconfigured to suit the new Lower Level spaces, using existing devices, of which there are more than needed, given the disappearance of corridors and rooms.

The renovation will incorporate additional infrastructure required to support a new fire alarm upgrade to be undertaken by the University in the future. This includes conduit between the lower level's existing control panel location and the new main level control/annunciator panel location at the main level south front door. Final scope will be coordinated and approved by Facilities and Operations and the Students' Union.



SUB Partial Fire Alarm Riser , from May 2003 As-Built Drawing

7.6 Security and Monitoring Systems

Access Control and Door Monitoring

The west student offices require card readers, electric strikes, and door-position/door-locked status monitoring. Other perimeter and interior access control positions, and tie-in provisions will be coordinated with the University.

CCTV Cameras

Existing cameras are analog type. New cameras will be of IP-based digital technology. Discussion will be required as to whether there is to be edge storage at the cameras or simply central storage, the degree of acuity of image, day-night vision technology, intrusion detection, and other intelligent video applications. Camera locations, interior and exterior, and connections to Campus Security will be coordinated with Campus Security, as will interoperability between the access control/monitoring provisions and the CCTV

7.7 Information/Communications Technology

New Technical (Main Terminal) Room

Existing main terminal room 0-30C is in the demolition area. As mentioned previously, its location is moving to the north end of the Lower Level, between the Bookstore and the existing SUBprint area. It will house switches and servers. Its power supply will be the normal-power distribution system. Any uninterruptible power required by the components is outside the scope of this project.

Local Copper Data Cable Distribution

A cable tray will originate in the new Technical Room, head south down the corridor, and then west to service the student office area. Conduits from the data outlets in rooms will spill into the cable tray.

A minimum of three (3) Category 6 UTP FT6-rated copper cables will be run from the new Technical room and other data switch locations to voice/data outlets in offices.
The island workstations in the Reception area will be fed via conduits in the new floor-levelling concrete slab.

Backbone Cable to Remote Locations

Various other locations in the Lower Level and throughout the building are currently connected to 0-30C. They will be fibre-backbone reconnected to the new room. There is apparently very little or no existing wireway of any sort from 0-30C to these locations. A combination of cable tray and dedicated conduits will be provided to form true wireway connectivity to these locations.

Wireless Infrastructure

There are Wireless Access Points (WAP's positioned throughout the subject space. Determination of adequate coverage of the renovated space, from both anticipated load and spacing aspects, will be made in coordination with the University's Academic Information & Communication Technologies (AICT) group.

Telephone

All telephone horizontal cabling will be the minimum Category 6 from the Technical room to the voice outlets. It will be terminated on a separate patch panel in the data switch rack, from which it can either become part of the data network or be patched over to termination blocks on the wall backboard.

Multimedia

Power-and-data locations for video displays have been designated throughout the space.
In the atrium, two floor-box locations are planned for presentations to assemblies seated on the risers to main level.

In the meeting rooms, it is intended to have floor boxes in each room, along with higher wall power and data outlets for smart boards.

The above outlet points' signal cables will be connected back to a head-end room located near the northeast corner at the east end of the north hallway.

8. APPENDIX A – DRAWING INDEX

ARCHITECTURAL

A1.02	Site Plan
A2.01	Level 0 Floor Plan
A2.02	Level 1 Floor Plan
A2.04	Large Scale Level 0 Floor Plan
A2.05	Tower Floors Construction Plans
A3.01	Level 0 – North Reflected Ceiling Plan
A3.02	Level 0 – South Reflected Ceiling Plan
A4.01	Exterior Elevations and Building Sections
A4.02	Building Sections

ELECTRICAL

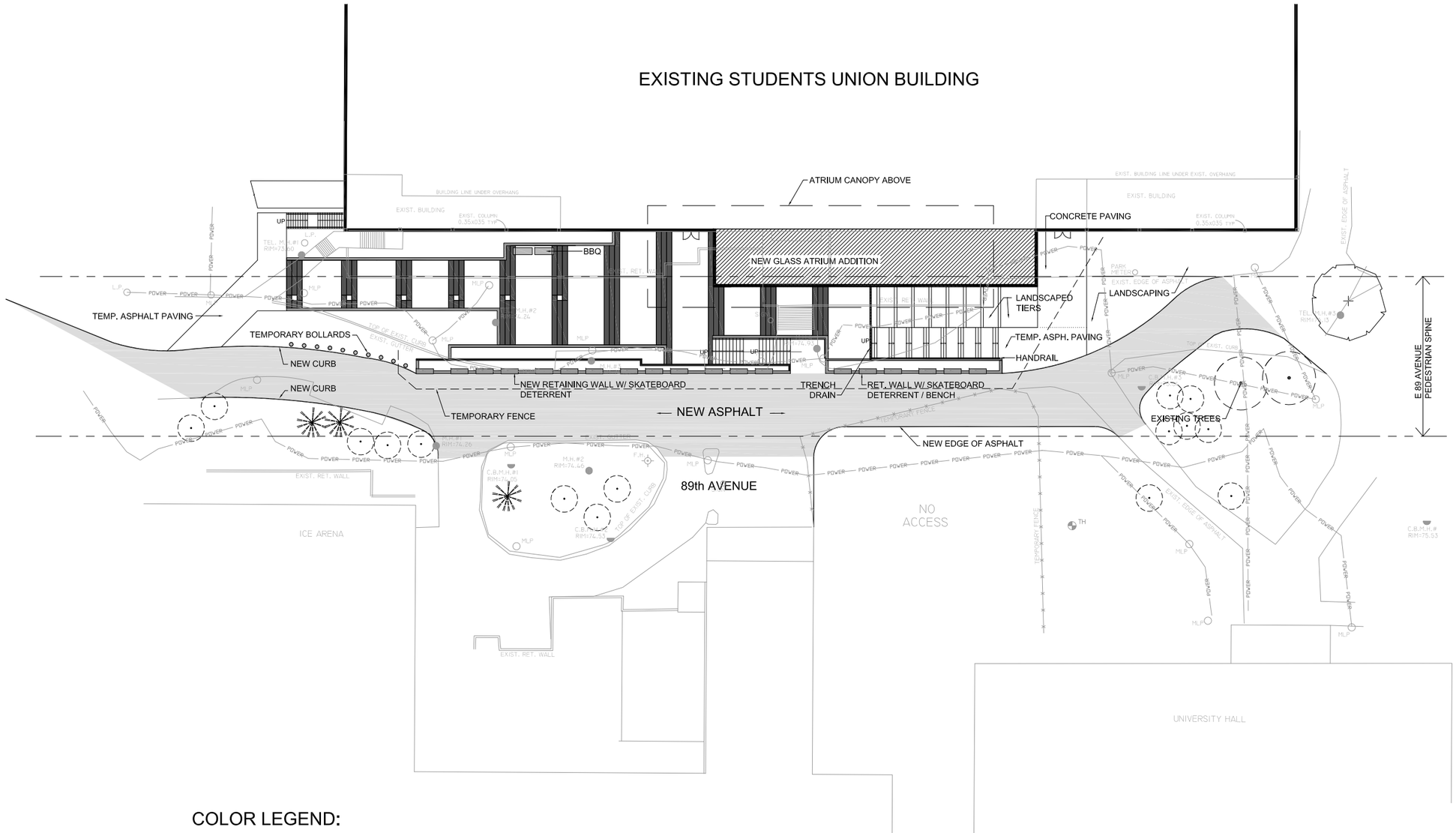
E0.01	Electrical Legend
E0.02	Site Demolition
E0.03	Lower Level Demolition
E0.04	Main level Demolition
E0.05	Tower Floors' Demolition
E1.01	Site Plan
E2.01	Lower Level Lighting
E2.02	Lower Level Power
E2.03	Lower Level Communications
E2.04	Lower Level Fire Alarm
E2.05	(Reserved)
E2.06	Main Level Power
E2.07	(Reserved)
E2.08	Main Level Fire Alarm
E2.09	Tower Floors' Lighting
E2.10	Tower Floors' Power & Systems
E4.01	Risers and Schedules
E6.01	Details

MECHANICAL

M1	Large Scale Mechanical Plan
M2	Schematic and Piping Plan
M3	Ventilation Demo
M4	Ventilation Plan

STRUCTURAL

S0.01	General Notes
S0.02	Typical Details Sheet 1 of 2
S0.03	Typical Details Sheet 2 of 2
S0.10	Loading Diagrams
S0.50	3D View
S2.01	Pile/Footing Plan
S2.02	Basement Framing Plan
S2.03	Main Floor Framing Plan
S2.04	Roof Framing Plan
S4.01	Substructure Sections & Details
S4.02	Substructure Sections & Details
S4.03	Substructure Sections & Details



COLOR LEGEND:

SHADED AREA REPRESENTS NEW ASPHALT

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant

DIALOG™

Consultants Seal

Consultants Permit

Key Plan

NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

Client Approval Date

Dwg Title: **SITE PLAN**

Building: **STUDENTS' UNION BUILDING #54400**

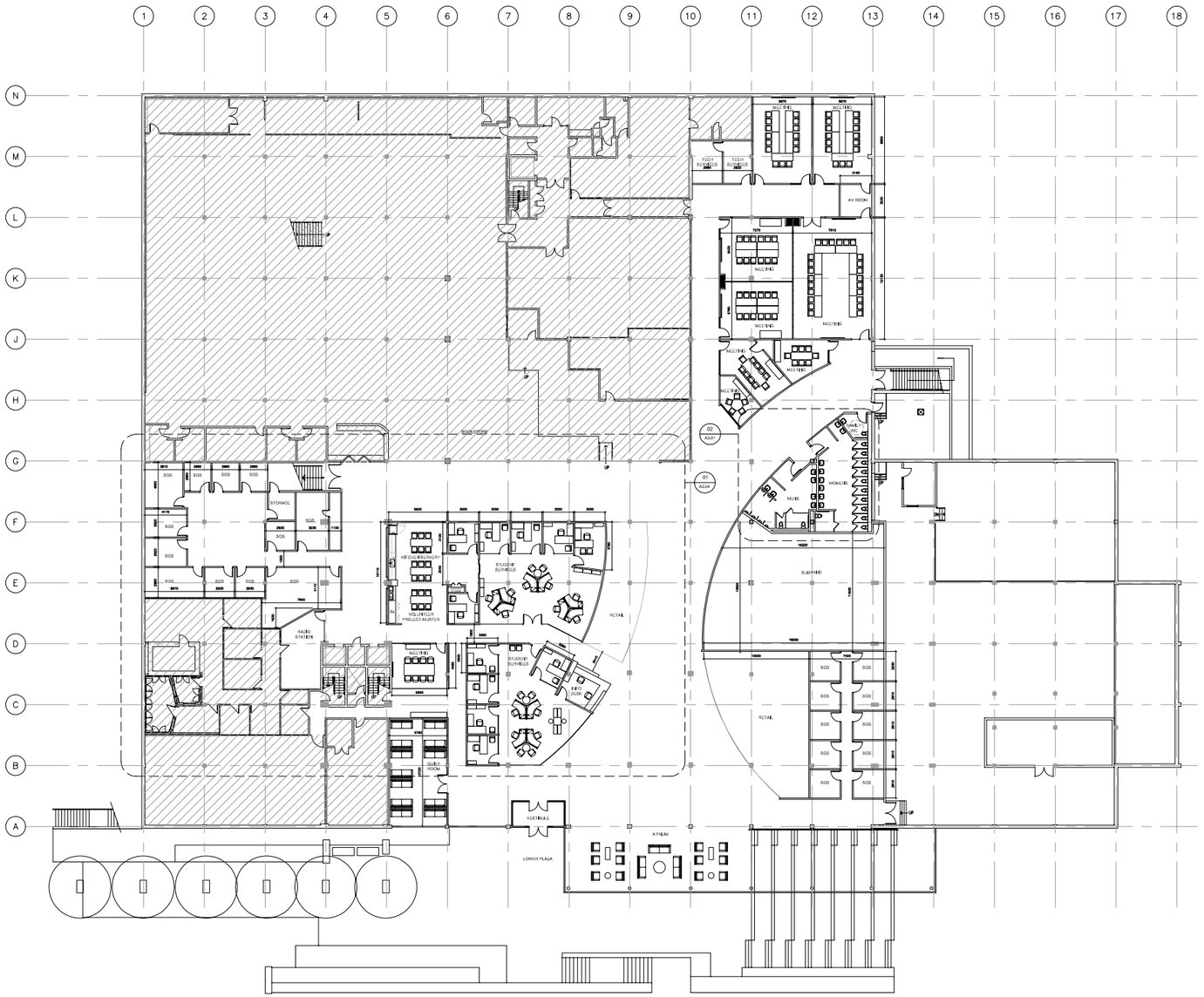
Job Number: XXX## Work Order Number: #####

Arch ☐ Mech ■ Elect ■ Strct ■ Drawn By: Author

Plot Date: 12/02/2013 11:37:49 AM Scale: A Revision

Sheet: University Dwg Num

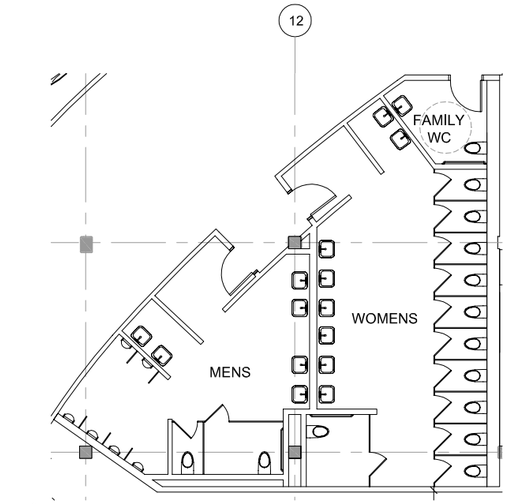
01257E02000 A1.02



01 A2.01 LEVEL 0 FLOOR PLAN

SCALE: 1:150

LS:Building\01257E\02\3 2D WD\ARCH\Working\SUB-OO-A-201 2013-03-04.dwg



01 A2.01 LARGE SCALE WASHROOM FLOOR PLAN - LEVEL 0

SCALE: 1:50

LS:Building\01257E\02\3 2D WD\ARCH\Working\SUB-OO-A-201 2013-03-04.dwg

TYPICAL INTERIOR PARTITIONS

TYPICAL OFFICE PARTITION - STC 45+
16mm GYPSUM BOARD
92mm STUDS, STUD AT 400mm O.C.
BATT INSULATION TO FULL DEPTH OF STUD
16mm GYPSUM BOARD

TYPICAL MEETING ROOM PARTITION - STC 55
2 LAYERS 16mm GYPSUM BOARD
92mm STUDS, STUD AT 400mm O.C.
BATT INSULATION TO FULL DEPTH OF STUD
2 LAYERS 16mm GYPSUM BOARD

TYPICAL PARTITION - STC 45
16mm GYPSUM BOARD
92mm STUDS, STUD AT 400mm O.C.
16mm GYPSUM BOARD

TYPICAL CHEM / HEAVY FIRE RATED PARTITION - STC 45
DIRECT MOUNT FIRE RESISTANT GYPSUM
16mm FIRE RATED GYPSUM BOARD
92mm STUDS, STUD AT 400mm O.C.
MINERAL FIBRE INSULATION TO FULL DEPTH OF STUD
16mm FIRE RATED GYPSUM BOARD

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG™

Consultants Seal | Consultants Permit

Key Plan — NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

Client Approval Date

Dwg Title: **LEVEL 0 FLOOR PLAN**

Building: **STUDENTS' UNION BUILDING #54400**

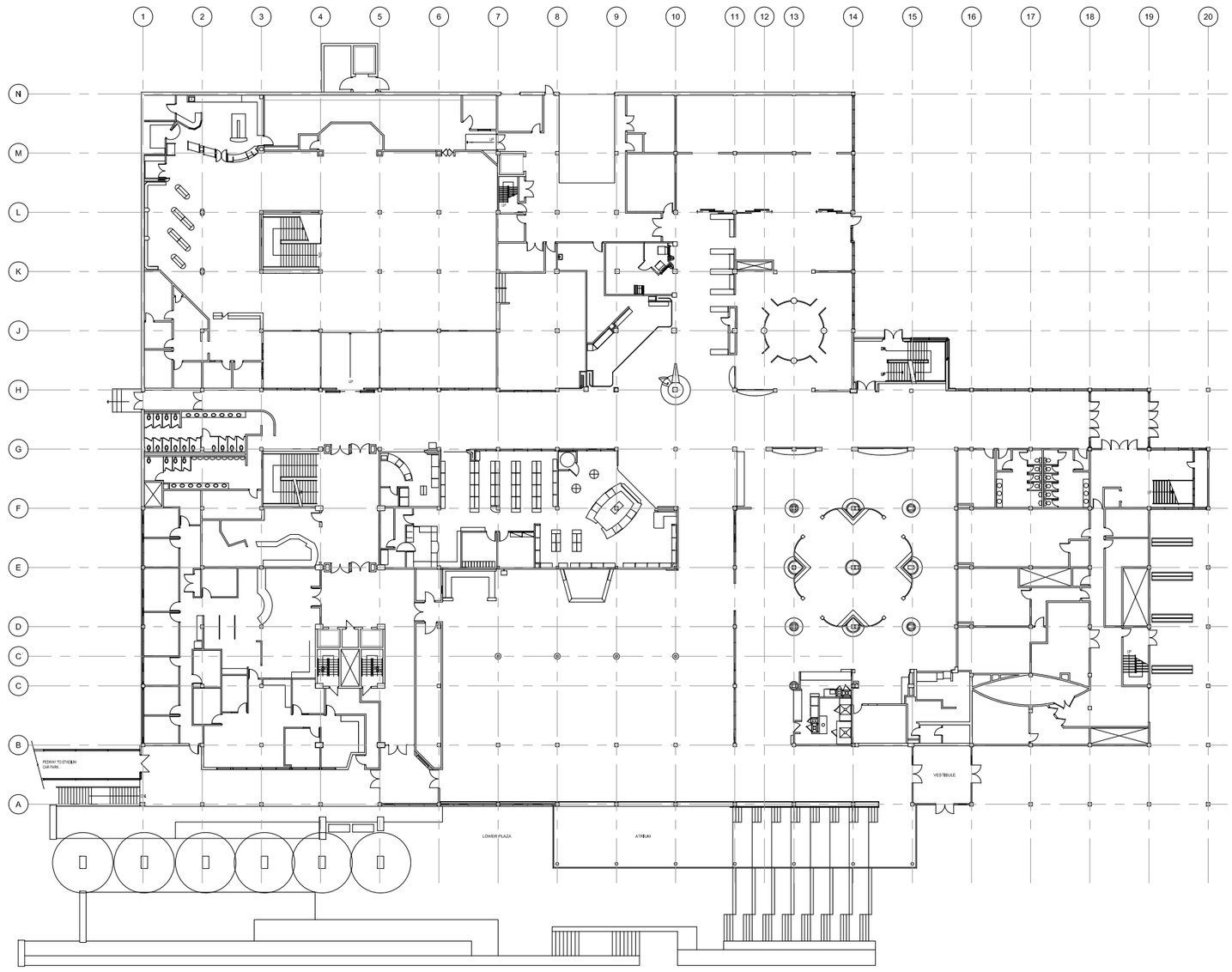
Job Number: XXX## | Work Order Number: #####

Arch ☐ Mech ☐ Elect ☐ Struct ☐ | Drawn By: Author

Plot Date: 15/02/2013 | Issue: A | Revision

Sheet | University Dwg Num

01257E02000 | **A2.01**



TYPICAL INTERIOR PARTITIONS

TYPICAL OFFICE PARTITION - STC 45N
2 LAYERS 16mm GYPSUM BOARD
92mm STEEL STUD AT 405mm O.C.
BATT INSULATION TO FULL DEPTH OF STUD
16mm GYPSUM BOARD

TYPICAL MEETING ROOM PARTITION - STC 55
2 LAYERS 16mm GYPSUM BOARD
92mm STEEL STUD AT 405mm O.C.
BATT INSULATION TO FULL DEPTH OF STUD
2 LAYERS 16mm GYPSUM BOARD

TYPICAL PARTITION - STC 45
16mm GYPSUM BOARD
92mm STEEL STUD AT 405mm O.C.
16mm GYPSUM BOARD

TYPICAL ONE(1) HOUR FIRE RATED PARTITION - STC 45
ONE(1) HOUR FIRE RESISTANCE RATED
16mm FIRE RATED GYPSUM BOARD
152mm STEEL STUD AT 405mm O.C.
MINERAL FIBRE INSULATION TO FULL DEPTH OF STUD
16mm FIRE RATED GYPSUM BOARD

N

01 / A2.02 LEVEL 1 FLOOR PLAN

SCALE: 1:150

L:\Building\01257E02\3 2D WO\ARCH\Working\SUB-DD-Ar202.dwg

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG™

Consultants Seal | Consultants Permit

Key Plan

NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: STUDENTS' UNION BUILDING

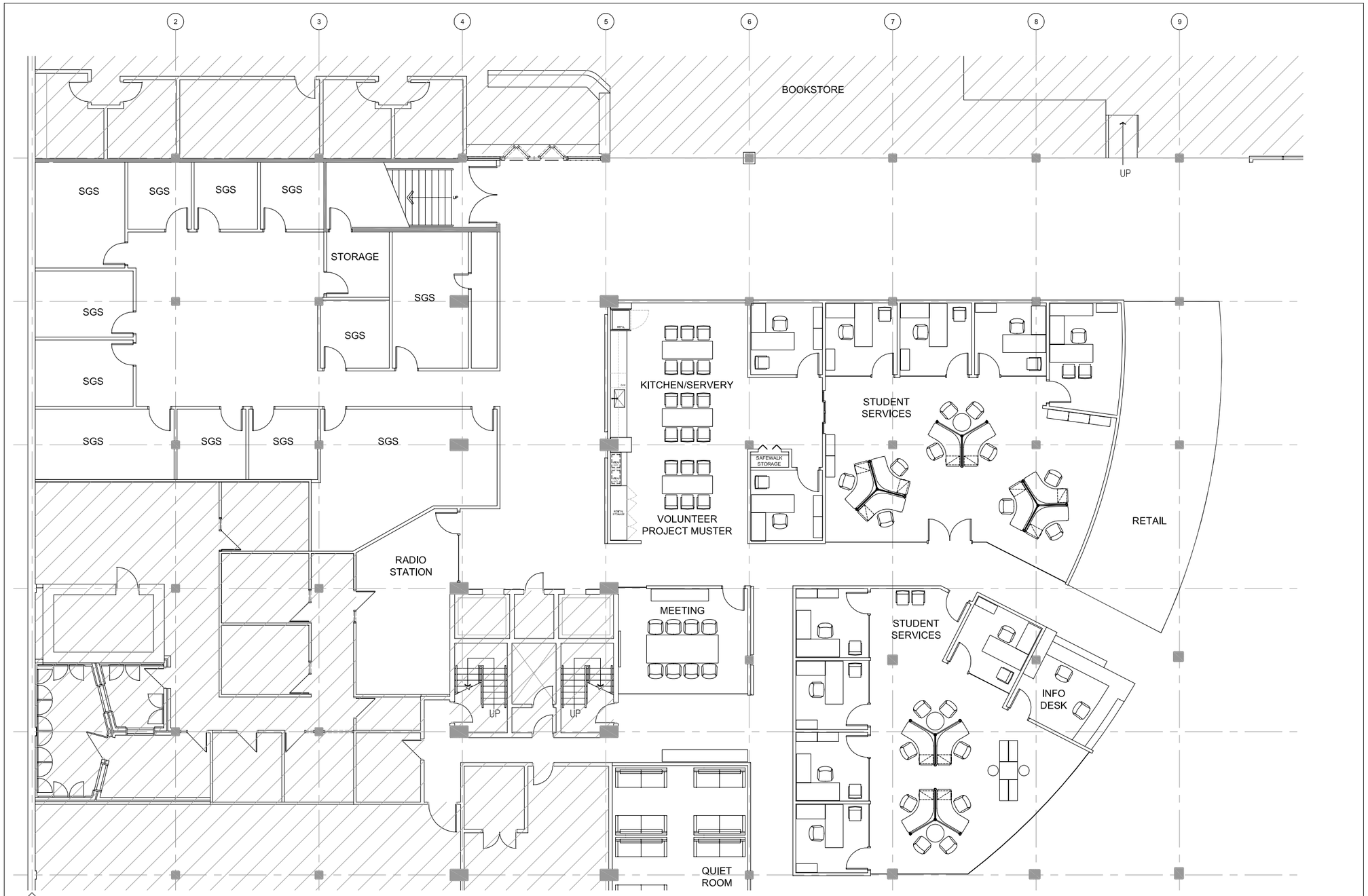
ADDITION AND RENOVATION

Client Approval Date

Dwg Title: **LEVEL 1 FLOOR PLAN**

Building: **STUDENTS' UNION BUILDING #54400**

Job Number: XXX##		Work Order Number: #####	
Arch ☐ Mech ☐ Elect ☐ Struct ☐		Drawn By: Author	
Plot Date: 15/02/2013	Issue: A		Revision:
Sheet:		University Dwg Num:	
01257E02000			A2.02



01 A2.04 LARGE SCALE FLOOR PLAN - LEVEL 0

SCALE: 1:50

L:\Buildings\01257\E\023 2D WD\ARCH\Working\SUB-DD-4v204 2013-03-04.dwg

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant

DIALOG™

Consultants Seal | Consultants Permit

Key Plan

NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

Client Approval Date

Dwg Title **LARGE SCALE LEVEL 0 FLOOR PLAN**

Building **STUDENTS' UNION BUILDING #54400**

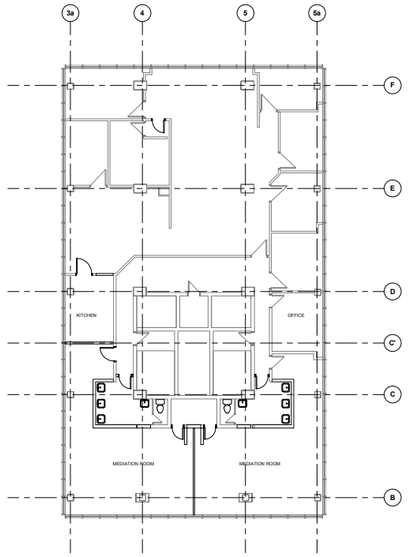
Job Number XXX## | Work Order Number #####

Arch ☐ Mech ☐ Elect ☐ Struct ☐ | Drawn By Author

Plot Date 15/02/2013 | Issue A | Revision

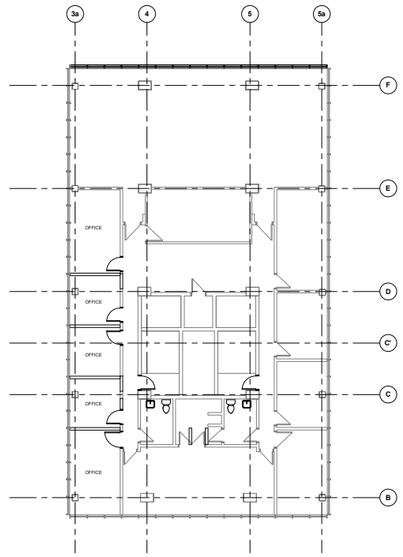
Sheet | University Dwg Num

01257E02000 | A2.04



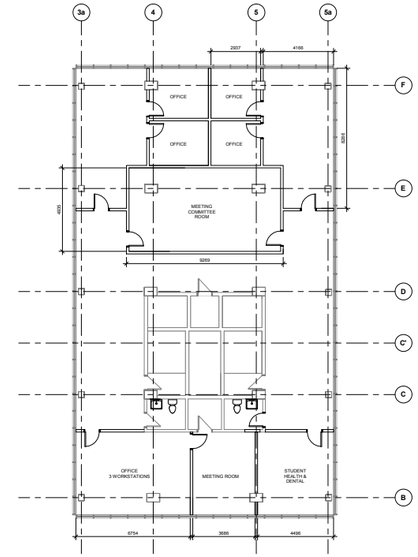
PROJECT NORTH

1 A2.05 **LEVEL 3 - CONSTRUCTION PLAN**
1 : 100



PROJECT NORTH

2 A2.05 **LEVEL 4 - CONSTRUCTION PLAN**
1 : 100



PROJECT NORTH

3 A2.05 **LEVEL 6 - CONSTRUCTION PLAN**
1 : 100

TYPICAL INTERIOR PARTITIONS

TYPICAL OFFICE PARTITION - STC 45
16mm GYPSUM BOARD
92mm STEEL STUD AT 405mm O.C.
BATT INSULATION TO FULL DEPTH OF STUD
16mm GYPSUM BOARD

TYPICAL MEETING ROOM PARTITION - STC 55
2 LAYERS 16mm GYPSUM BOARD
92mm STEEL STUD AT 405mm O.C.
BATT INSULATION TO FULL DEPTH OF STUD
2 LAYERS 16mm GYPSUM BOARD

TYPICAL PARTITION - STC 45
16mm GYPSUM BOARD
92mm STEEL STUD AT 405mm O.C.
16mm GYPSUM BOARD

TYPICAL ONE(1) HOUR FIRE RATED PARTITION STC 45
MASONRY/CONCRETE MEMBER FIRE RATED
16mm FIRE RATED GYPSUM BOARD
152mm STEEL STUD AT 405mm O.C.
MINERAL FIBRE INSULATION TO FULL DEPTH OF STUD
16mm FIRE RATED GYPSUM BOARD

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant

DIALOG™

Consultants Seal

Consultants Permit

Key Plan

NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

Client Approval Date

Dwg Title **TOWER FLOORS CONSTRUCTION PLANS**

Building **STUDENTS' UNION BUILDING #54400**

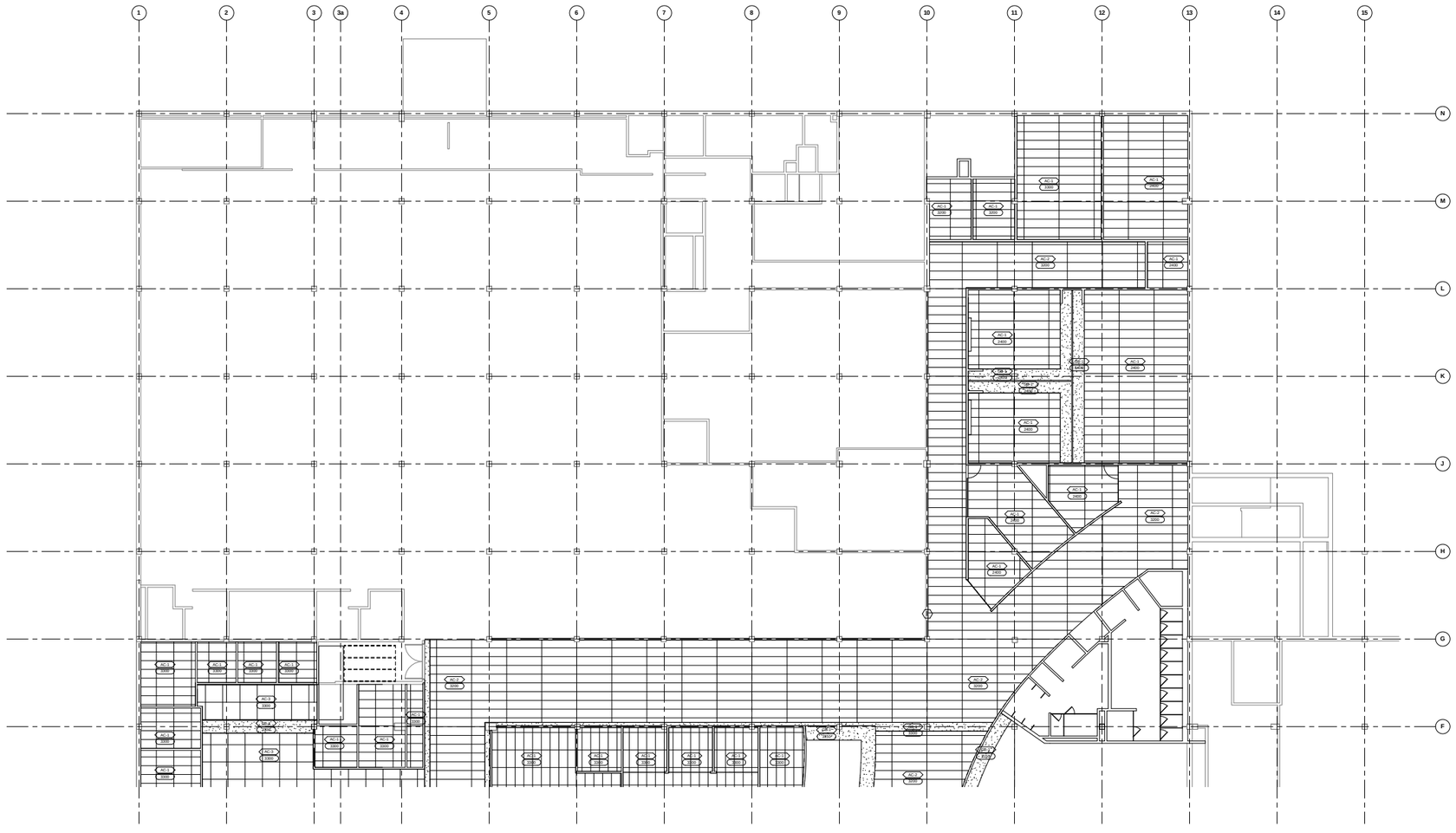
Job Number XXX## Work Order Number #####

Arch ☐ Mech ■ Elect ■ Strct ■ Drawn By Author

Plot Date 04/03/2013 4:20:14 PM Issue A Revision

Sheet University Dwg Num

01257E02000 **A2.05**



1 A3.01 **LEVEL 0 - NORTH REFLECTED CEILING PLAN**
1 : 100

CEILING TYPES	
AC-1	610x1220mm ACOUSTICAL CEILING PANEL IN SUSPENDED T-BAR
AC-2	610x2440mm ACOUSTICAL CEILING PANEL IN SUSPENDED T-BAR
AC-3	1220x1220mm ACOUSTICAL CEILING PANEL IN SUSPENDED T-BAR
GB-1	TYPE 1 - SUSPENDED GYPSUM BOARD CEILING

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant

DIALOG™

Consultants Seal

Consultants Permit

Key Plan

NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department **STUDENTS' UNION BUILDING**

ADDITION AND RENOVATION

Client Approval Date

Dwg Title **LEVEL 0 - NORTH REFLECTED CEILING PLAN**

Building **STUDENTS' UNION BUILDING #54400**

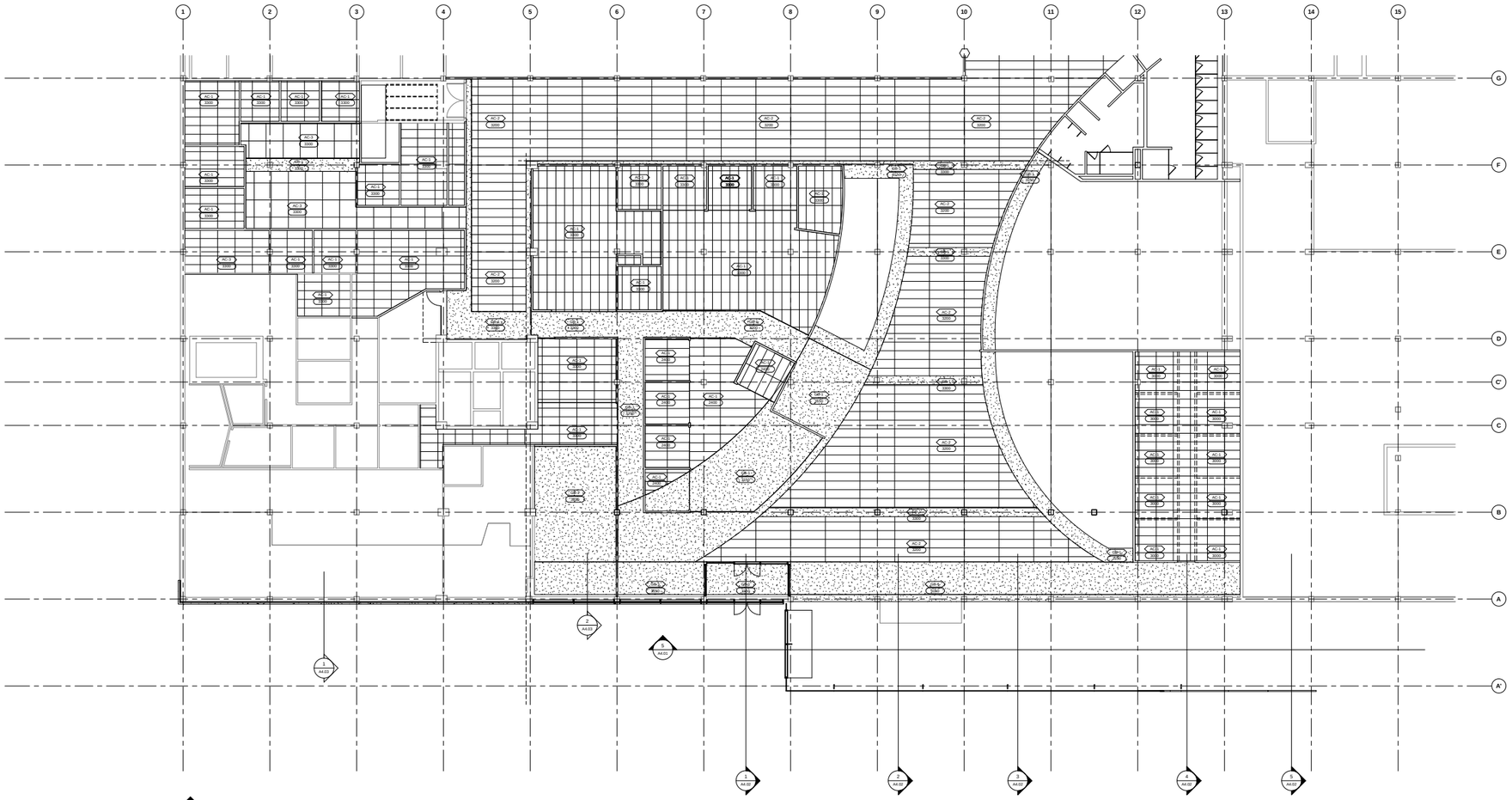
Job Number **XXX##** Work Order Number **#####**

Arch ☐ Mech ■ Elect ■ Strct ■ Drawn By **Author**

Plot Date **04/04/2013 5:10:58 PM** Issue **A** Revision

Sheet University Dwg Num

01257E02000 **A3.01**



PROJECT NORTH

1 / A3.02 **LEVEL 0 - SOUTH REFLECTED CEILING PLAN**
1 : 100

CEILING TYPES	
ACT-1	610x1220mm ACOUSTICAL CEILING PANEL IN SUSPENDED T-BAR
ACT-2	610x2440mm ACOUSTICAL CEILING PANEL IN SUSPENDED T-BAR
ACT-3	1220x1220mm ACOUSTICAL CEILING PANEL IN SUSPENDED T-BAR
GB-1	TYPE 1 - SUSPENDED GYPSUM BOARD CEILING

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant

DIALOG™

Consultants Seal

Consultants Permit

Key Plan

NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: **STUDENTS' UNION BUILDING**

ADDITION AND RENOVATION

Client Approval Date

Dwg Title: **LEVEL 0 - SOUTH REFLECTED CEILING PLAN**

Building: **STUDENTS' UNION BUILDING #54400**

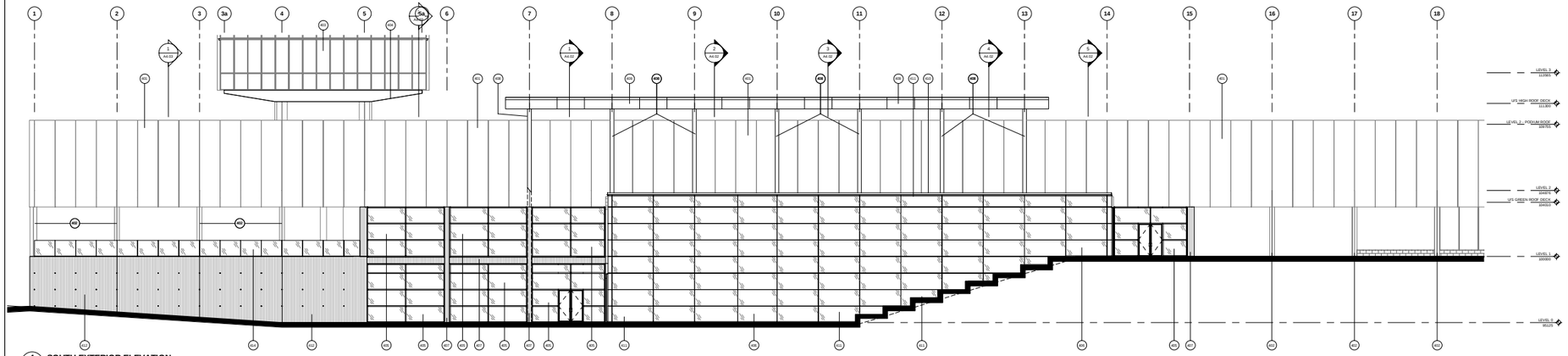
Job Number: **XXX##** Work Order Number: **#####**

Arch ☐ Mech ■ Elect ■ Strct ■ Drawn By: **Author**

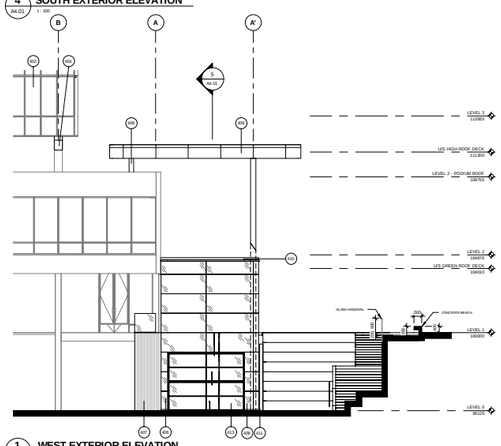
Plot Date: **04/04/2013 5:10:59 PM** Issue: **A** Revision:

Sheet: University Dwg Num:

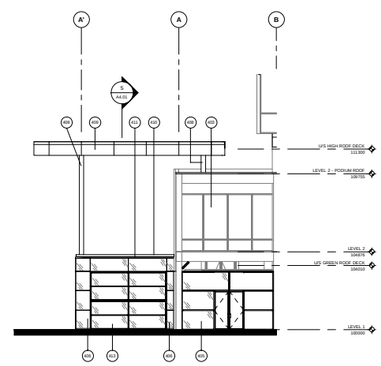
01257E02000 **A3.02**



4 SOUTH EXTERIOR ELEVATION
A4.01 1 : 100



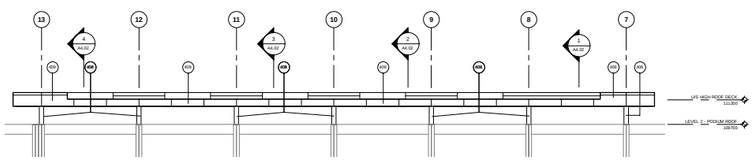
1 WEST EXTERIOR ELEVATION
A4.01 1 : 100 Back Ref: 1 / A2.01



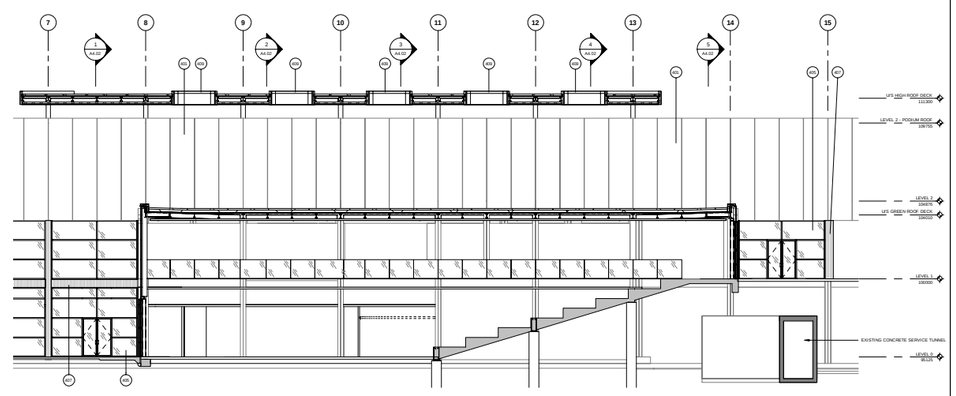
3 EAST EXTERIOR ELEVATION
A4.01 1 : 100 Back Ref: 2 / A2.01

Keynote Legend	
Key Value	Keynote Text

401	EXISTING PRE-CAST CONCRETE PANELS
402	EXISTING STRUCTURAL CONCRETE COLUMN
403	EXISTING GLAZED ALUMINUM CURTAIN WALL
404	EXISTING CONCRETE STRUCTURE
405	TRIPLE SEALED GLAZING UNIT IN PRE-FINISHED THERMALLY ENHANCED ALUMINUM CURTAIN WALL
406	TRIPLE SEALED GLAZING UNIT IN CUSTOM STAINLESS STEEL SPIDER CONNECTION
407	CUSTOM BOARDFORM PRECAST CONCRETE PANEL
408	STRUCTURAL STEEL COLUMN, PAINTED
409	PRE-FINISHED COMPOSITE ALUMINUM PANEL SYSTEM
410	PRE-FINISHED ALUMINUM FLASHING
411	CUSTOM STAINLESS STEEL DRAINABLE GLAZING CHANNEL
412	SITE CAST REINFORCED BOARDFORM CONCRETE CLADDING
413	DOUBLE GLAZED ALUMINUM VERTICAL BI-FOLD DOOR
414	HEAT STRENGTHENED LAMINATED GLASS BALLUSTER WITH CUSTOM STAINLESS STEEL HANDRAIL
D201	REMOVE DOOR, FRAME AND HARDWARE
D204	REMOVE PARTITION OR PORTION OF PARTITION AS DIMENSIONED
D217	RETAIN EXISTING STRUCTURE AS INDICATED
D222	RETAIN EXISTING DOOR AS INDICATED



2 PARTIAL NORTH EXTERIOR ELEVATION
A4.01 1 : 100 Back Ref: /



5 BUILDING SECTION 6
A4.01 1 : 100

UNIVERSITY OF ALBERTA
PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG™

Consultants Seal | Consultants Permit

Key Plan — NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

Client Approval Date

Dwg Title: **EXTERIOR ELEVATIONS AND BUILDING SECTIONS**

Building: **STUDENTS' UNION BUILDING #54400**

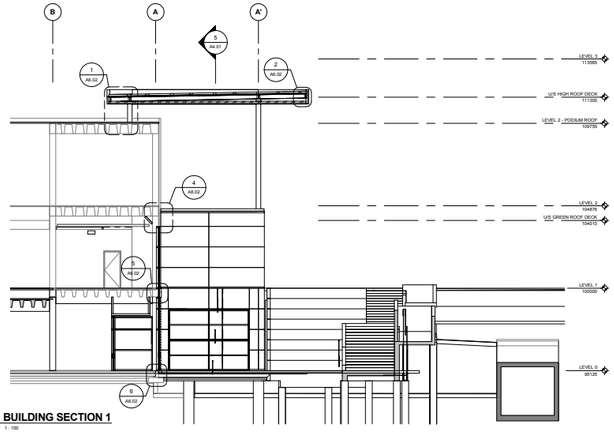
Job Number: XXX## | Work Order Number: #####

Arch ☐ Mech ■ Elect ■ Struct ■ | Drawn By: Author

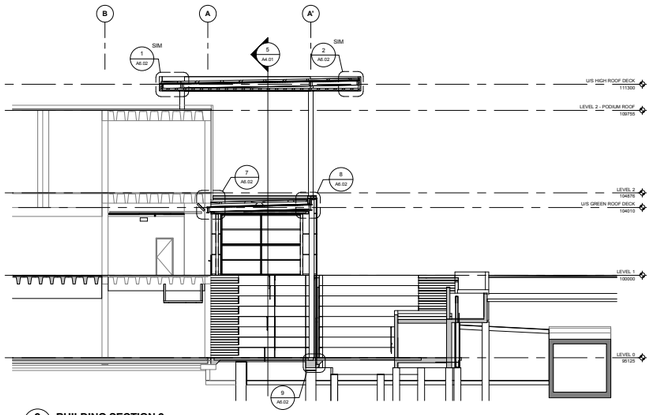
Plot Date: 04/04/2013 3:35:06 PM | Issue: A | Revision

Sheet | University Dwg Num

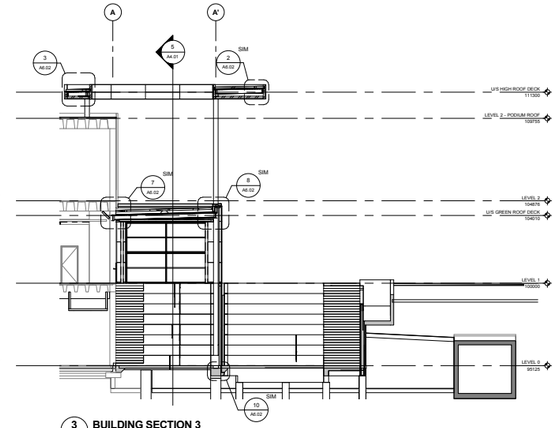
01257E02000 | A4.01



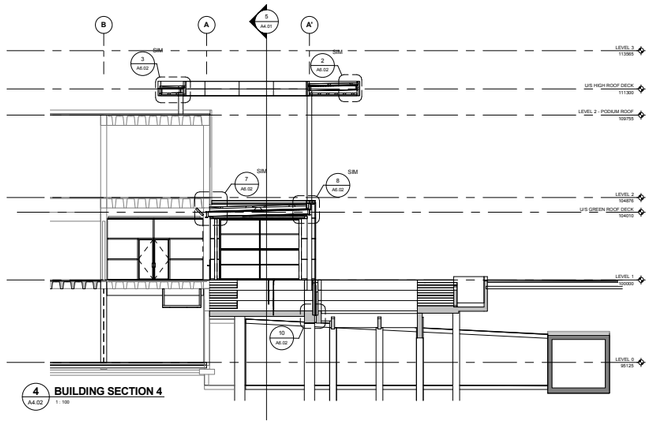
1 A4.02 **BUILDING SECTION 1**
1 : 100



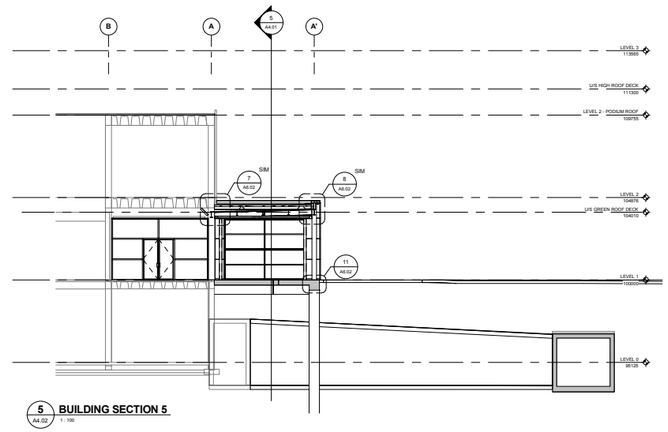
2 A4.02 **BUILDING SECTION 2**
1 : 100



3 A4.02 **BUILDING SECTION 3**
1 : 100



4 A4.02 **BUILDING SECTION 4**
1 : 100



5 A4.02 **BUILDING SECTION 5**
1 : 100

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant

DIALOG™

Consultants Seal

Consultants Permit

Key Plan

NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department **STUDENTS' UNION BUILDING**

ADDITION AND RENOVATION

Client Approval Date

Dwg Title **BUILDING SECTIONS**

Building **STUDENTS' UNION BUILDING #54400**

Job Number **XXX##** Work Order Number **#####**

Arch ☐ Mech ■ Elect ■ Strct ■ Drawn By **Author**

Plot Date **15/02/2013 3:33:52 PM** Issue **A** Revision

Sheet University Dwg Num

01257E02000 **A4.02**

GENERAL NOTES

1. READ THE STRUCTURAL DRAWINGS IN CONJUNCTION WITH THE SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS.
2. OPENINGS AND SLEEVES SHOWN ARE LOCATED AND DIMENSIONED FOR DETAILING PURPOSES ONLY. THE EXACT SIZES AND LOCATIONS MUST BE COORDINATED WITH THE CONSULTANT AND TRADES DURING CONSTRUCTION.
3. REFER TO THE ARCHITECTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS FOR LOCATIONS AND DIMENSIONS OF OPENINGS AND SLEEVES NOT SHOWN ON THE STRUCTURAL DRAWINGS. REPORT ANY DISCREPANCIES TO THE CONSULTANT AND OBTAIN INSTRUCTIONS PRIOR TO PROCEEDING WITH THE WORK.
4. REFER TO THE ARCHITECTURAL, MECHANICAL, AND ELECTRICAL DRAWINGS FOR THE LOCATION OF PITS, EQUIPMENT BASES, SUMPS, DEPRESSIONS, GROOVES, CURBS, CHAMFERS, AND SLABS NOT SHOWN ON THE STRUCTURAL DRAWINGS.
5. THE STRUCTURAL DRAWINGS ARE FOR THE COMPLETED PROJECT. THE CONSTRUCTION MANAGER IS RESPONSIBLE FOR THE SAFETY OF WORKERS AND THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION. IN PARTICULAR, THE RESPONSIBILITY CONCERNING THE SAFETY OF WORKERS AND STRUCTURES DURING ALL DEMOLITION WORK IS ASSUMED BY THE CONSTRUCTION MANAGER. REPORT ANY POTENTIAL RISKS TO THE CONSULTANT AND OBTAIN INSTRUCTIONS PRIOR TO PROCEEDING WITH THE WORK. CONSTRUCTION LOADS SHALL NOT EXCEED THE LOADS TABULATED IN THE DESIGN NOTES.
6. MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE ALBERTA BUILDING CODE 2006.

EXISTING STRUCTURE NOTES

1. THE STRUCTURAL DESIGN IS BASED UPON INFORMATION SHOWN ON THE RECORD DRAWINGS FOR THE EXISTING BUILDINGS AND ON LIMITED VISUAL OBSERVATIONS ON SITE.
2. REPORT TO THE CONSULTANT DISCREPANCIES THAT HAVE THE POTENTIAL TO AFFECT THE WORK AND OBTAIN INSTRUCTION PRIOR TO PRECEDING.
3. SURVEY EXISTING STRUCTURE TO CONFIRM EXISTING STRUCTURAL DIMENSIONS, ELEVATIONS AND LOCATIONS PRIOR TO COMMENCEMENT OF WORK.

DESIGN NOTES

1 LOADS SHOWN ON DRAWINGS

.1 UNLESS NOTED OTHERWISE, SPECIFIED LOADS ARE SHOWN ON THE DRAWINGS.

2 IMPORTANCE CATEGORY

IMPORTANCE CATEGORY	NORMAL

3 LATERAL LOADS FROM WIND AND EARTHQUAKE

.1 WIND LOADS

REFERENCE VELOCITY PRESSURE (q1/50)	0.45 kPa
INTERNAL PRESSURE CATEGORY	2
IMPORTANCE FACTOR	1.0 (ULS) 0.75 (SLS)

.2 EARTHQUAKE LOADS

Sa(0.2)	0.12
Sa(0.5)	0.06
Sa(1.0)	0.02
Sa(2.0)	0.01
PGA	0.06
FOUNDATION SITE CLASS	D
Rd	1.5
Ro	1.3
IMPORTANCE FACTOR	1.0

4. SPECIFIED LOADS FOR FLOOR AND ROOF DESIGN

.1 REFER TO S0.10 FOR LOADING DIAGRAMS FOR SNOW, WIND & RAIN.

.2 BASEMENT & MAIN FLOOR ADDITION

LIVE	4.8 kPa
SUPERIMPOSED DEAD	0.25 kPa
CONCENTRATED LIVE	9 kN

.3 LOW ROOF

LIVE	4.8 kPa *
SUPERIMPOSED DEAD, CEILINGS & SERVICES ALLOWANCE	0.25 kPa
SOIL OR GRAVEL	3.0 kPa **
BASIC SNOW & RAIN (PLUS DRIFTING & PONDING)	1.46 kPa

.4 HIGH ROOF

LIVE	1.0 kPa
SUPERIMPOSED DEAD	0.5 kPa
BASIC SNOW & RAIN (PLUS DRIFTING & PONDING)	1.46 kPa

* LOW ROOF STRUCTURE RATED FOR POTENTIAL FUTURE ACCESSIBIITY & ASSEMBLY.

** LOW ROOF STRUCTURE DESIGNED FOR POTENTIAL FUTURE EXTENSIVE GREEN ROOF **OR** CURRENTLY ENVISAGED 150mm GRAVEL ON INVERTED ROOF ASSEMBLY.

5. RAIN LOADS ON ROOFS

.1 LOADS FROM THE ACCUMULATION OF WATER ON ROOFS DURING A ONE DAY RAIN (1/50) OF 97 mm WERE DETERMINED FROM CONSIDERATION OF ROOF SLOPES AND PARAPET HEIGHT, ASSUMING THAT RAIN LEADERS ARE ACCIDENTALLY PLUGGED. REFER TO S0.10 FOR LOADING DIAGRAMS.

6. WALL CLADDING LOADS

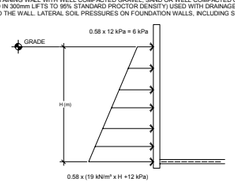
.1 SPECIFIED DEAD LOAD FROM WALL CLADDING

GLASS ONLY	1.0 kPa
LIGHTWEIGHT METAL PANELS	0.4 kPa

7. GEOTECHNICAL NOTES

.1 A GEOTECHNICAL REPORT HAS BEEN PREPARED BY THURBER ENGINEERING LTD. TITLED "PROPOSED STUDENTS' UNION BUILDING ADDITION DESKTOP GEOTECHNICAL EVALUATION" DATED SEPTEMBER 24, 2012. ADDITIONAL RECOMMENDATIONS/ADDENDA HAVE ALSO BEEN PREPARED DATED SEPTEMBER 26, 2012

.2 BACKFILL RETAINING WALL WITH WELL COMPACTED GRAVEL, SAND OR WELL COMPACTED CLAY (COMPACTED IN 300mm LIFTS TO 95% STANDARD PROCTOR DENSITY) USED WITH DRAINAGE BOARD ATTACHED TO THE WALL. LATERAL SOIL PRESSURES ON FOUNDATION WALLS, INCLUDING SURCHARGE ARE:



.3 FOUNDATION WALLS ARE DESIGNED ASSUMING THAT AN EFFECTIVE DRAINAGE SYSTEM FOR SOIL IS PROVIDED BEHIND THE WALLS.

.4 RETAINING WALLS ARE DESIGNED AS A COMPLETE SYSTEM INTEGRAL WITH THE ADJACENT HORIZONTAL SLABS, GRADE BEAMS AND PILES. DO NOT BACKFILL UNTIL THESE ADJACENT STRUCTURES ARE CONSTRUCTED AND HAVE GAINED THE SPECIFIED STRENGTH.

.5 REFER TO S1.01 FOR GEOTECHNICAL NOTES RELATED TO PILE FOUNDATIONS.

CONCRETE NOTES

1. CAST-IN-PLACE CONCRETE

.1 CONCRETE: CONFORM TO CSA A23.1-09, NORMAL WEIGHT, MEETING THE FOLLOWING REQUIREMENTS UNLESS NOTED OTHERWISE:

CLASS OF CONCRETE	CLASS OF EXPOSURE	MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS (MPa)	NOMINAL MAX. SIZE OF AGGREGATE (mm)	AIR CONTENT (%)	MAXIMUM WATER/ CEMENTING MATERIALS RATIO
EXTERIOR CONCRETE					
PILES	S-3	30	20	4-7	0.50
PILE CAPS	S-3	30	20	4-7	0.50
EXTERIOR STRUCTURAL SLABS & BEAMS	C-1	35	20	5-8	0.40
RETAINING WALLS	C-1/S-3	35	20	5-8	0.40
S/TE CONCRETE (NON-STRUCTURAL INCLUDING SLAB ON GRADE	C-2	32	20	5-8	0.45
ARCHITECTURAL CONCRETE CLADDING	C-2	32	14	5-8	0.45
INTERIOR CONCRETE					
SLABS ON GRADE & TOPPING SLABS (NON-STRUCTURAL)	N	25	20	-	0.50
SLABS, STRUCT. SLAB ON-GRADE, AND BEAMS	N	30	20	-	0.50
MASONRY CORE FILLS	N	20	10	-	-

.2 FLY ASH CONTENT SHALL NOT EXCEED 40% OF TOTAL CEMENTITIOUS MATERIALS FOR VERTICAL ELEMENTS AND 25% FOR HORIZONTAL ELEMENTS. FLY ASH CONTENT NOT TO EXCEED 6% FOR POLISHED CONCRETE SLABS. REFER TO ARCHITECTURAL DRAWINGS FOR EXTENT.

.3 ADMIXTURES CONTAINING CALCIUM CHLORIDE ARE NOT PERMITTED.

.4 SUPERPLASTICIZING ADMIXTURE IS PERMITTED TO ALLOW PUMPING OR IMPROVE SURFACE FINISHING OF CONCRETE.

.5 FOR FLOOR SLABS, DESIGN THE CONCRETE MIXTURE WITH AGGREGATE GRADING AND WATER-TO-CEMENTING MATERIALS RATIO THAT MINIMIZE SHRINKAGE.

.6 REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR CONCRETE FINISH REQUIREMENTS.

2 REINFORCING

.1 REINFORCING STEEL: BILLET STEEL CONFORMING TO CAN/CSA-G30.18-09, GRADE 400. USE GRADE 400W WHERE WELDING IS NOTED OR REQUIRED.

.2 BENDING, CUTTING AND PLACING OF REINFORCING STEEL SHALL CONFORM TO CAN/CSA A23.1-09 AND CAN/CSA A23.3-04(R2010).

.3 WELDING SHALL CONFORM TO CSA W186-M1990(R2007).

.4 REINFORCE SLABS ON GRADE, INCLUDING SIDEWALKS, WITH WWR152x152-MW34.9 x MW34.9 UNLESS OTHER REINFORCEMENT IS SHOWN.

3 REINFORCED CONCRETE WORK

.1 REINFORCED CONCRETE WORK SHALL CONFORM TO THE REQUIREMENTS OF CAN/CSA-A23.1-09.

.2 CONCRETE COVER TO REINFORCING STEEL SHALL CONFORM TO THE APPLICABLE REQUIREMENT LISTED BELOW THAT RESULTS IN THE GREATEST AMOUNT OF COVER:

CONCRETE CAST AGAINST EARTH	75 mm
CONCRETE CAST IN FORMS BUT EXPOSED TO EARTH OR WEATHER	
-SLABS EXPOSED TO DEICING CHEMICALS	
-TOP BARS	60 mm
-BOTTOM BARS	40 mm
-OTHER SLABS	
-TOP BARS	40 mm
-BOTTOM BARS	40 mm
-BEAM STIRRUPS, GIRDER STIRRUPS, COLUMN TIES	40 mm
-WALLS	40 mm
CONCRETE NOT EXPOSED TO WEATHER AND NOT IN CONTACT WITH EARTH	
-SLAB BOTTOM REINFORCING	
-2h OR LESS FIRE RESISTANCE RATING	25 mm
-SLAB TOP REINFORCING	
-TYPICAL	25 mm
-FOR PARKADE SLABS	40 mm
-BEAMS, GIRDERS, COLUMNS (TO TIES), STIRRUPS	30 mm
-WALLS EXPOSED TO FIRE ON BOTH SIDES (VERTICAL REINFORCING)	50 mm
-OTHER WALLS	25 mm

.3 UNLESS NOTED OTHERWISE, PROVIDE DOWELS OF THE SAME SIZE, NUMBER AND SPACING WHERE REINFORCING IS SPLICED.

.4 SUBMIT TO THE CONSULTANT FOR REVIEW THE LOCATION OF ALL CONSTRUCTION JOINTS NOT SHOWN ON THE DRAWINGS.

.5 HORIZONTAL CONSTRUCTION JOINTS SHALL NOT BE MADE IN BEAMS UNLESS SHOWN ON THE DRAWINGS.

.6 SUBMIT TO THE CONSULTANT FOR REVIEW THE LOCATIONS OF ALL SLEEVES AND OPENINGS NOT SHOWN ON THE DRAWINGS. THE CONSULTANT WILL PROVIDE STRUCTURAL DETAILS AS REQUIRED FOR SLEEVES AND OPENINGS.

.7 SLEEVES SHALL NOT BE PLACED HORIZONTALLY ALONG OR VERTICALLY THROUGH BEAMS UNLESS AUTHORIZED BY THE CONSULTANT.

.8 UNLESS NOTED OTHERWISE ON PLANS, PROVIDE THE FOLLOWING CAMBIERS: BEAMS, GIRDERS, AND SLABS (SPANS GREATER THAN 6 m) SPAN/600

.9 CAMBER BOTH THE UNDERSIDE AND THE TOP OF THE CONCRETE IN A PARABOLIC PROFILE SO THAT THE STRUCTURAL THICKNESS SHOWN ON THE DRAWING IS MAINTAINED.

.10 HORIZONTAL CONSTRUCTION JOINTS IN FOUNDATION WALLS ARE NOT PERMITTED EXCEPT WHERE SHOWN ON DRAWINGS OR WHERE AUTHORIZED BY THE CONSULTANT.

.11 ALL REINFORCEMENT EMBEDDED WITH ADHESIVE SHALL GET SUFFICIENT EMBEDMENT TO DEVELOP THE FULL CAPACITY OF THE EMBEDDED BAR U.N.O.

.12 EPOXY ADHESIVE SYSTEM:

TWO COMPONENT, INJECTABLE ADHESIVE SPECIFICALLY MANUFACTURED FOR USE IN INSTALLING ANCHORS INTO EXISTING CONCRETE.

ACCEPTABLE MATERIALS: HILTI CANADA LTD., HIT HY-150 (MAX)

4 CONCRETE FORMWORK

.1 FORMWORK: CONFORM TO CAN/CSA-S269.3-M92(R2008).

.2 PROVIDE 100 THICK VOID FORM UNDER ALL GRADE BEAMS, PILE CAPS, STRUCTURAL SLABS ON GRADE AND WHERE SHOWN.

.3 VOID FORM MATERIALS:

TYPE 'A' EXPANDED POLYSTYRENE COMPRESSIBLE FILL MATERIAL. FOR USE UNDER WALLS AND GRADE BEAMS.

TYPE 'B' 6 mm MIN. HARD BOARD OVER CRUSHABLE BIODEGRADABLE FILLER OF SUFFICIENT STRENGTH TO SUPPORT THE SLAB CONCRETE AND CONSTRUCTION LOAD UNTIL THE CONCRETE HAS CURED. FOR USE UNDER STRUCTURAL SLABS ON GRADE

.4 REFER TO ARCHITECTURAL DRAWINGS FOR CHAMFERS ON CORNERS OF COLUMNS, BEAMS AND WALLS. USE 20x20 FORMED CHAMFERS ON EXPOSED CORNERS UNLESS CHAMFERS OF OTHER SIZES ARE SHOWN ON DRAWINGS. REFER ALSO TO SPECIFICATION.

STEEL NOTES

1 STRUCTURAL STEEL

.1 DESIGN, FABRICATE, AND ERECT STRUCTURAL STEEL IN ACCORDANCE WITH CAN/CSA-S16-09 AND THE CISC CODE OF STANDARD PRACTICE FOR STRUCTURAL STEEL.

.2 MATERIAL REQUIREMENTS

- W SHAPES:	CAN/CSA-G40.20/G40.21-04 GRADE 350W OR ASTM A992/A992M-06A GRADE 50
- WWF SHAPES:	CAN/CSA-G40.20/G40.21-04 GRADE 350W
- HSS SECTIONS (SQUARE OR RECTANGULAR):	CAN/CSA-G40.20/G40.21-04 GRADE 350W CLASS C
- HSS SECTIONS (CIRCULAR):	ASTM A500
- OTHER STRUCTURAL SHAPES AND PLATES:	CAN/CSA-G40.20/G40.21-04 GRADE 300W
- BOLTS:	ASTM A325
- HEADED STUD ANCHORS:	ASTM A108 TENSILE STRENGTH 414 MPa
- ANCHOR RODS:	ASTM F1554 GRADE 55
- SHOP PRIMER AND FIELD TOUCHUP PRIMER:	REFER TO SPECIFICATION

.3 DESIGN CONNECTIONS IN ACCORDANCE WITH CAN/CSA-S16-09. DESIGN BRACE CONNECTIONS, SO DESIGNATED, FOR THE LOADS SHOWN ON THE DRAWINGS. USE A MINIMUM OF 2 BOLTS IN EACH BOLTED CONNECTION.

.4 WELDING SHALL CONFORM TO CSA W59-03(R2008) AND BE DONE WITH MATCHING ELECTRODES.

.5 GROUT UNDER COLUMNS SHALL BE NON-SHRINK, NON-STAIN AND PLACED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. THE MINIMUM COMPRESSIVE STRENGTH OF GROUT SHALL BE 35 MPa AT 4 DAYS.

.6 PROVIDE 10 mm DIAMETER WEEP HOLES AT THE TOPS AND BOTTOMS OF HSS COLUMNS.

.7 REFER TO SPECIFICATION FOR REQUIREMENTS FOR STAIRS, LADDERS, HANDRAILS, AND PLATFORMS NOT DETAILED ON THE STRUCTURAL DRAWINGS.

.8 PROVIDE SUPPORT FOR STEEL DECK AT ALL STEEL COLUMN PENETRATIONS.

.9 STEELWORK FINISHING IN ACCORDANCE WITH ARCHITECT'S DETAILS. NOTE AESS-3 IN SOME LOCATIONS.

2 STEEL DECKING

.1 DESIGN, FABRICATE AND ERECT STEEL DECKING IN ACCORDANCE WITH CAN/CSA-S136-07.

.2 WELDING SHALL CONFORM TO CSA W59-03(R2008).

.3 USE DECK OF A DEPTH AND MINIMUM BASE STEEL THICKNESS AS SHOWN ON DRAWINGS. INCREASE THICKNESS IF NECESSARY TO SUPPORT THE LOADS SPECIFIED. MAXIMUM LIVE OR SNOW LOAD DEFLECTION SHALL BE SPAN/360.

.4 DECK UNITS SHALL BE CONTINUOUS OVER AT LEAST 3 SPANS WHERE STRUCTURAL FRAMING PERMITS.

.5 THE STEEL DECKS ON THIS PROJECT ACTS AS A DIAPHRAGM FOR THE DISTRIBUTION OF LATERA FORCES TO THE LATERAL LOAD RESISTING ELEMENTS. UNLESS NOTED OTHERWISE ON THE DRAWINGS, FASTEN THE DECK TO ALL SUPPORTING STEEL AS FOLLOWS:

ROOF DECK:

-19mm DIA PUDDLE WELDS @ MAX 305 o/c SUPPORT FASTENING AND BUTTON PUNCHES @ MAX 305 o/c SIDE LAP FASTENING

.6 SHEET STEEL SHALL CONFORM TO ASTM A653, GRADE A STRUCTURAL QUALITY GRADE 230. GALVANIZED WITH ZINC COATING OF 275 AS DESIGNATED BY ASTM A653M U.N.O.

CONSTRUCTION TOLERANCES

1. CONCRETE

.1 UNLESS NOTED OTHERWISE, TOLERANCES SHALL COMPLY WITH REQUIREMENTS OF CAN/CSA-A23.1-09 AND CAN/CSA-S16-09

2. STEEL

.1 UNLESS NOTED OTHERWISE, TOLERANCES SHALL COMPLY WITH REQUIREMENTS OF CAN/CSA-S16-09

SYMBOLS

Ø	DIAMETER
□	SQUARE
@	AT
L	STEEL ANGLE
	SLAB SPAN DIRECTION
	BOTTOM REINFORCING BAR
	TOP REINFORCING BAR
15MC	DENOTES 15M EPOXY COATED BAR
C10M1000	DENOTES 10M BAR OF LENGTH 1000 mm PLUS THE STANDARD HOOK FOR A 10M BAR
10M1000 U-BAR	DENOTES 10M U-BAR WITH 1000mm LONG LEGS
1000	LENGTH TO TIE IN WITH BARS E/F OF MEMBER U.N.O.

LEGEND

XX	UNIFORM ELEVATION OF T/O BEAM/JOIST WITH RESPECT TO SPECIFIED ELEVATION ON PLAN
XX	SPOT ELEVATION OF U/S STEEL DECK WITH RESPECT TO SPECIFIED ELEVATION ON PLAN
D	SLAB DEPRESSION FOR FLOOR DRAIN
25	MIDSPAN UPWARD BEAM CAMBER

ABBREVIATIONS

ALT.	ALTERNATING	LLV	LONG LEG VERTICAL
A.F.F.	ABOVE FINISHED FLOOR	LSH	LONG SIDE HORIZONTAL
ARCH.	ARCHITECTURAL	MAX.	MAXIMUM
BOT.	BOTTOM	MECH.	MECHANICAL
B/TWN.	BETWEEN	MC	MOMENT CONNECTION
BLL	BOTTOM LOWER LAYER	MIN.	MINIMUM
BML	BOTTOM MIDDLE LAYER	MIR.	MIRRORED
BUL	BOTTOM UPPER LAYER	N.T.S.	NOT TO SCALE
CANT.	CANTILEVER	O/A	OVERALL
c/c	CENTRE-TO-CENTRE	o/o	OUT-TO-OUT
C/L	CENTRELINE	OWSJ	OPEN WEB STEEL JOIST
COL	COLUMN	R/W	REINFORCED WITH
CONC.	CONCRETE	R.E.	RIGHT END
CONN.	CONNECTION	REINF.	REINFORCING
CONT.	CONTINUOUS	REM.	REMAINDER
C/W	COMPLETE WITH	REV.	REVERSED
DIA.	DIAMETER	RHE	RIGHT HAND END
DO	DITTO	SCHED.	SCHEDULE
DN.	DOWN	SDL.	SUPERIMPOSED DEAD LOAD
DP.	DEEP	S/M.	SIMILAR
DWG.	DRAWING	S.P.M.D.D.	STANDARD PROCTOR MAXIMUM DRY DENSITY
EE	EACH END		
E/F	EACH FACE	STGD.	STAGGERED
ELECT.	ELECTRICAL	STRUCT.	STRUCTURAL
ELEV.	ELEVATION	TEMP.	TEMPERATURE
E/W	EACH WAY	T&B	TOP AND BOTTOM
FDN.	FOUNDATION	T/O	TOP OF
GL	GRIDLINE	TYP.	TYPICAL
H.E.E.	HOOKED EACH END	TLL	TOP LOWER LAYER
H.E.F.	HORIZONTAL EACH FACE	TML	TOP MIDDLE LAYER
HORZ.	HORIZONTAL	TUL	TOP UPPER LAYER
INT.	INTEGRITY STEEL	U.N.O.	UNLESS NOTED OTHERWISE
L.E.	LEFT END	U/S	UNDERSIDE
LHE	LEFT HAND END	V.E.F.	VERTICAL EACH FACE
LL	LIVE LOAD	VERT.	VERTICAL
LG.	LONG	W/	WITH
LLBB	LONG LEG BACK TO BACK	W.P.	WORK POINT
LLH	LONG LEG HORIZONTAL		

MINIMUM SLAB REINFORCEMENT TABLE

SLAB THICKNESS (mm)	INTERIOR SLABS (As = .002xAg)	EXTERIOR SLABS (As = .0025xAg)
≤ 100	10M @ 450	10M @ 400
100 - 125	10M @ 400	10M @ 320
126 - 150	10M @ 330	10M @ 265
151 - 175	10M @ 285	10M @ 225
176 - 200	10M @ 250	10M @ 400 (T&B)
201 - 250	10M @ 400 (T&B)	10M @ 320 (T&B)
251 - 300	10M @ 325 (T&B)	10M @ 265 (T&B)

TABLE NOTES:

.1 PROVIDE MINIMUM REINFORCING EACH WAY IN SLABS AND TOPPINGS WITHOUT SPECIFIED REINFORCING.

.2 PROVIDE MINIMUM REINFORCEMENT PERPENDICULAR TO PRINCIPAL REINFORCEMENT IN ALL SLABS. PLACE ALTERNATING TOP AND BOTTOM WHERE TOP REINFORCING SPECIFIED.

MINIMUM WALL REINFORCEMENT TABLE

WALL THICKNESS (mm)	DIRECTION	REINFORCEMENT	
150	HORIZONTAL	10M @ 330	1-LAYER
	VERTICAL	10M @ 450	1-LAYER
175	HORIZONTAL	10M @ 285	1-LAYER
	VERTICAL	10M @ 380	1-LAYER
200	HORIZONTAL	10M @ 250	1-LAYER
	VERTICAL	10M @ 330	1-LAYER
250	HORIZONTAL	15M @ 400	EACH FACE
	VERTICAL	15M @ 500	EACH FACE
300	HORIZONTAL	10M @ 330	EACH FACE
	VERTICAL	10M @ 450	EACH FACE
350	HORIZONTAL	10M @ 285	EACH FACE
	VERTICAL	10M @ 380	EACH FACE
400	HORIZONTAL	10M @ 250	EACH FACE
	VERTICAL	10M @ 330	EACH FACE

TABLE NOTES:

.1 PROVIDE MINIMUM REINFORCING IN WALLS WITHOUT SPECIFIED REINFORCING.

.2 PLACE 2-15M AT TOP AND 2-20M AT BOTTOM OF EACH WALL UNLESS SHOWN OTHERWISE.

.3 HORIZONTAL $As_{min} = 0.002Ag$ VERTICAL $As_{min} = 0.0015Ag$

SLAB, BEAM, AND WALL HORIZONTAL EMBEDMENT AND LAP SPLICE LENGTHS

BAR SIZE	TENSION EMBEDMENT				TENSION LAP SPLICE				COMPRESSION EMBEDMENT				COMPRESSION LAP SPLICE			
	25 MPa	30 MPa	35 MPa	40 MPa	25 MPa	30 MPa	35 MPa	40 MPa	25 MPa	30 MPa	35 MPa	40 MPa	25 MPa	30 MPa	35 MPa	40 MPa
10M	400	350	350	300	500	450	450	400	200	200	200	200	300	300	300	300
15M	600	550	500	450	750	700	650	600	300	300	300	300	450	450	450	450
20M	750	700	650	600	1000	900	850	800	400	400	400	400	600	600	600	600
25M	1200	1100	1000	950	1550	1400	1300	1250	500	450	450	450	750	750	750	750
30M	1450	1300	1200	1150	1850	1700	1550	1450	600	550	550	550	900	900	900	900
35M	1650	1500	1400	1300	2150	1950	1800	1700	700	650	650	650	1050	1050	1050	1050

COLUMN, ZONE, AND WALL VERTICAL EMBEDMENT AND LAP SPLICE LENGTHS

BAR SIZE	TENSION EMBEDMENT				TENSION LAP SPLICE				COMPRESSION EMBEDMENT				COMPRESSION LAP SPLICE			
	25 MPa	30 MPa	35 MPa	40 MPa	25 MPa	30 MPa	35 MPa	40 MPa	25 MPa	30 MPa	35 MPa	40 MPa	25 MPa	30 MPa	35 MPa	40 MPa
10M	300	300	250	250	400	350	350	300	200	200	200	200	300	300	300	300
15M	450	400	400	350	600	550	500	450	300	300	300	300	450	450	450	450
20M	600	550	500	500	750	700	650	600	400	400	400	400	600	600	600	600
25M	900	850	800	750	1200	1100	1000	950	500	450	450	450	750	750	750	750
30M	1100	1000	950	900	1450	1300	1200	1150	600	550	550	550	900	900	900	900
35M	1300	1200	1100	1000	1650	1500	1400	1300	700	650	650	650	1050	1050	1050	1050

TABLE NOTES:

.1 BASED ON CSA A23.3-04.
.2 COLUMN & BEAM BARS ENCLOSED BY MINIMUM STIRRUPS OR TIES U.N.O.
.3 CLEAR COVER AT LEAST 1.0 x BAR DIAMETER.
.4 CLEAR SPACING AT LEAST 1.4 x BAR DIAMETER.
.5 INCREASE LENGTHS TO 1.31 x LISTED LENGTH FOR EPOXY COATED REINFORCING.
.6 WHERE BARS OF DIFFERENT DIAMETERS ARE LAPPED, PROVIDE LAP LENGTH IN ACCORDANCE WITH SMALLER BAR DIAMETER.

UNIVERSITY OF ALBERTA
PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG

Consultants Seal | Consultants Permit

Key Plan | NORTH

Issue

Letter	Date	By	Description
A	2013.02.15	RR	Issued for DD
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

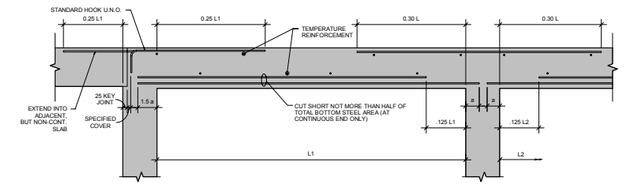
Client Approval Date

Dwg Title: **GENERAL NOTES**

Building: **STUDENTS' UNION BUILDING #54400**

Job Number	XXX##	Work Order Number	#####
Arch ☐ Mech ☐ Elect ☐ Strct ■		Drawn By	JS
Plot Date	12/03/2013 11:49:12 AM	Issue	A
Revision			
Sheet		University Dwg Num	
01257E02000			S0.01

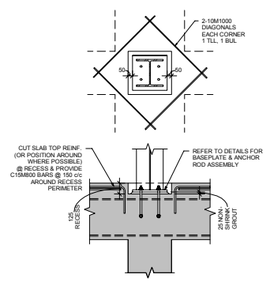
ONE-WAY SLAB REINFORCING — CF01



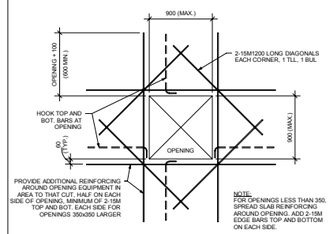
NOTES:

1 "L" IS THE GREATER OF L1 AND L2
2 "S" IS THE STIRRUP SPACING.
3 "a" EQUALS 10 BAR DIAMETERS BUT NOT LESS THAN 150 mm.
4 WHERE ONE-WAY SLABS SPAN PARALLEL TO INTEGRAL BEAMS OR WALLS, PROVIDE 15M @ 400 TOP PERPENDICULAR TO SPAN PROJECTING 1300 EACH SIDE OR 1300 ONE SIDE AND A STANDARD HOOK INTO EDGE BEAM OR EDGE WALL UNLESS NOTED OTHERWISE.
5 PROVIDE TEMPERATURE REINFORCEMENT PERPENDICULAR TO PRINCIPAL REINFORCEMENT IN ACCORDANCE WITH MINIMUM SLAB REINFORCEMENT TABLE UNLESS NOTED OTHERWISE.
6 USE TENSION LAP SPLICES FOR TEMPERATURE REINFORCING. STAGGER SPLICES.
7 PLACE TEMPERATURE REINFORCEMENT ALTERNATELY TOP AND BOTTOM WHERE PRINCIPAL SLAB REINFORCEMENT CONSISTS OF TOP AND BOTTOM BARS.
8 BOTTOM TEMPERATURE REINFORCEMENT TO EXTEND "a" INTO SUPPORTS.

REINFORCING FOR COLUMN BASEPLATE RECESSES — CF03

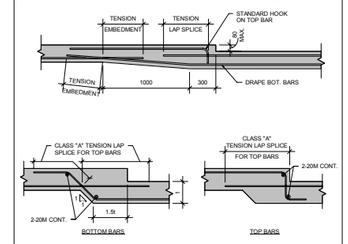


REINFORCING FOR OPENINGS IN SLABS — CF04



NOTE:
FOR OPENINGS LESS THAN 350, SPREAD SLAB REINFORCING AROUND OPENING. ADD 2-15M EDGE BARS TOP AND BOTTOM ON EACH SIDE.

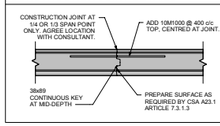
BAR SPLICING AT STEPS IN SLAB — CF05



STEPS OVER 75mm UP TO AND INCLUDING "1-50"

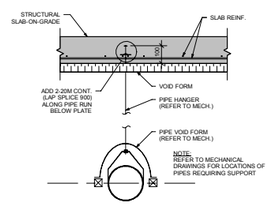
NOTE: THESE DETAILS GOVERN U.N.O. ON PLAN

STRUCTURAL SLAB CONSTRUCTION JOINT DETAILS — CF06



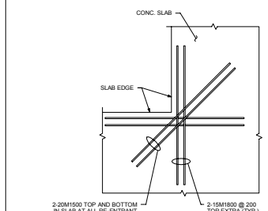
NOTE:
EXTEND TOP AND BOTTOM REINFORCEMENT THROUGH JOINT FOR THE FULL LENGTH SHOWN ON PLAN OR IN STANDARD DETAILS.

PIPE SUPPORT AT STRUCTURAL SLAB ON GRADE — CF07

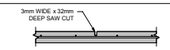


NOTE:
REFER TO MECHANICAL DRAWINGS FOR LOCATIONS OF PIPES REQUIRING SUPPORT

STRUCTURAL SLAB/TOPPING SLAB REENTRANT CORNER REINFORCING — CF08



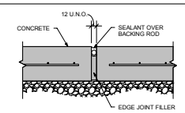
SLAB ON GRADE CONTROL JOINT — CF09



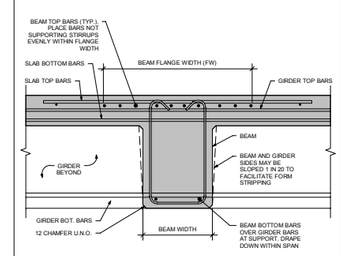
NOTE:

.1 MAKE SAW CUTS WITHIN 16 HOURS AFTER CASTING.
.2 MAKE JOINT CONTINUOUS TO FACE OF FOUNDATION WALLS OR COLUMNS.
.3 LOCATE SAW CUTS AT 6000 MAXIMUM EACH WAY. SUBMIT PLAN LOCATIONS TO CONSULTANT FOR REVIEW AND COMMENT PRIOR TO CASTING.

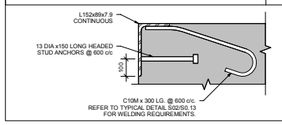
SLAB ON GRADE ISOLATION JOINT — CF10



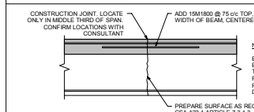
BEAM/GIRDER REINFORCING — CF17



FRAME AT SLAB OPENING — CF15

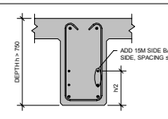


BEAM/GIRDER/SLAB BAND CONSTRUCTION JOINT — CF18

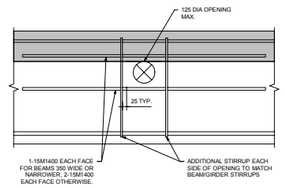


NOTE:
EXTEND TOP AND BOTTOM REINFORCEMENT THROUGH JOINT FOR THE FULL LENGTH SHOWN ON PLAN OR IN STANDARD DETAILS.

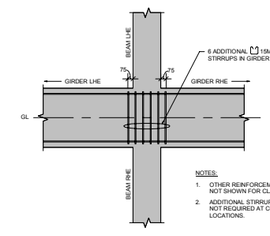
BEAM/GIRDER/SLAB BAND SIDE REINFORCEMENT — CF19



REINFORCING AT SMALL UNSCHEDULED BEAM/GIRDER WEB OPENINGS — CF20



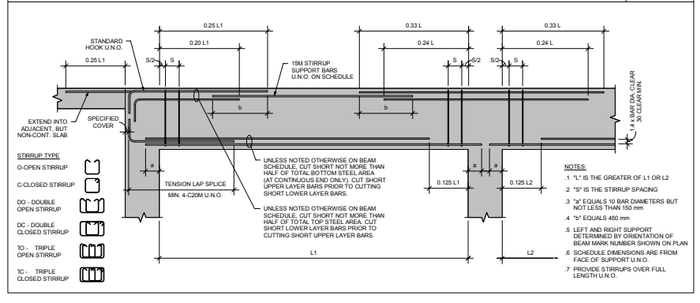
PLAN DETAIL BEAM HANGER STIRRUPS AT GIRDERS — CF21



NOTES:

1. OTHER REINFORCEMENT NOT SHOWN FOR CLARITY
2. ADDITIONAL STIRRUPS NOT REQUIRED AT COLUMN LOCATIONS.

BEAM/GIRDER/SLAB BAND REINFORCING DETAIL — CF22



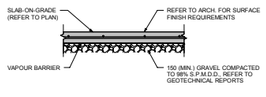
STIRRUP TYPE:

O-OPEN STIRRUP
C-CLOSED STIRRUP
DO - DOUBLE OPEN STIRRUP
DC - DOUBLE CLOSED STIRRUP
TO - TRIPLE OPEN STIRRUP
TC - TRIPLE CLOSED STIRRUP

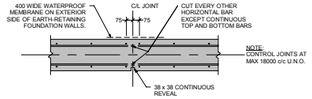
NOTES:

.1 "L" IS THE GREATER OF L1 OR L2
.2 "S" IS THE STIRRUP SPACING
.3 "a" EQUALS 10 BAR DIAMETERS BUT NOT LESS THAN 150 mm
.4 "b" EQUALS 450 mm
.5 LEFT AND RIGHT SUPPORT DETERMINED BY ORIENTATION OF BEAM MARK NUMBER SHOWN ON PLAN.
.6 SCHEDULE DIMENSIONS ARE FROM FACE OF SUPPORT U.N.O.
.7 PROVIDE STIRRUPS OVER FULL LENGTH U.N.O.

SLAB-ON-GRADE — CF30

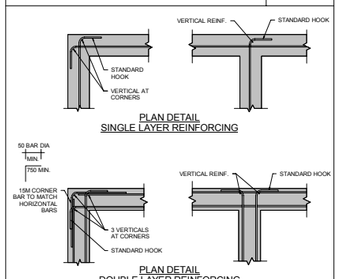


RETAINING WALL VERTICAL CONTROL JOINT — CW01

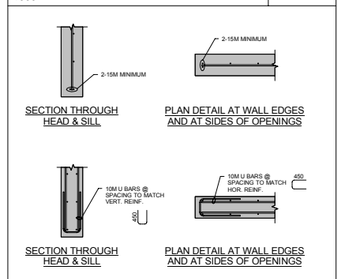


NOTE:
CONTROL JOINTS AT MAX 18000 c/c U.N.O.

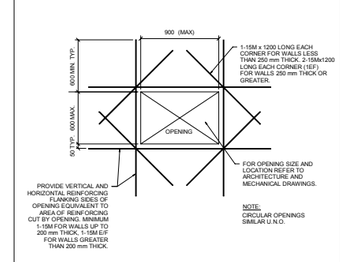
WALL AND GRADE BEAM CORNER BARS — CW04



WALL EDGE AT OPENINGS LARGER THAN 1000 — CW05

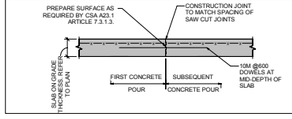


SMALL WALL OPENING REINFORCEMENT — CW06

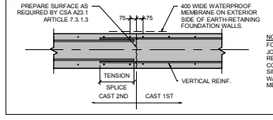


NOTE:
CIRCULAR OPENINGS SIMILAR U.N.O.

CONSTRUCTION JOINT IN SLAB-ON-GRADE — CF32



WALL VERTICAL CONSTRUCTION JOINT — CW02



NOTE:
FOR HORIZONTAL JOINTS MAKE REINFORCING CONTINUOUS. USE SIMILAR WATERPROOFING MEMBRANE

UNIVERSITY OF ALBERTA
PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG™

Consultants Seal | Consultants Permit

Key Plan — NORTH

Issue

Letter	Date	By	Description
A	2013.02.15	RR	Issued for DD
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

Client Approval Date

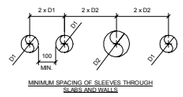
Dwg Title: **TYPICAL DETAILS SHEET 1 OF 2**

Building: **STUDENTS' UNION BUILDING #54400**

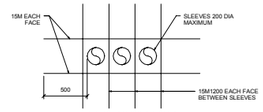
Job Number: XXX## | Work Order Number: #####
Arch ☐ Mech ☐ Elect ☐ Shell ■ | Drawn By: JS
Plot Date: 12/03/2013 11:49:15 AM | Issue: A | Revision
Sheet | University Dwg Num

01257E02000 **S0.02**

WALL AND SLAB REINFORCEMENT FOR SLEEVES — CW07



MINIMUM SPACING OF SLEEVES THROUGH SLABS AND WALLS

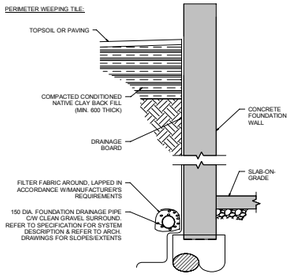


REINFORCING AROUND SLEEVES THROUGH SLABS AND WALLS

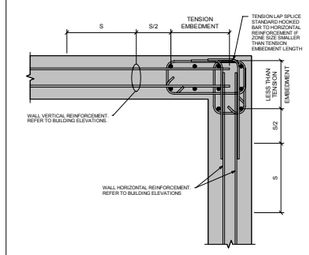
NOTES:

1. SLEEVES SHALL BE CIRCULAR UNLESS AUTHORIZED BY CONSULTANT.
2. FOR SLEEVES LARGER THAN 200 DIA, OBTAIN DIRECTION FROM CONSULTANT FOR ADDITIONAL REINFORCING REQUIRED ON A CASE-BY-CASE BASIS.
3. COORDINATE WITH CONSULTANT LAYOUT FOR ALL GROUPS OF SLEEVES CONTAINING FOUR OR MORE INDIVIDUAL SLEEVES. PROVIDE REINFORCEMENT AT GROUPS OF SLEEVES CONTAINING FOUR OR MORE INDIVIDUAL SLEEVES AS ILLUSTRATED AND PROVIDE ADDITIONAL REINFORCING ON A CASE-BY-CASE BASIS AS DIRECTED BY CONSULTANT.

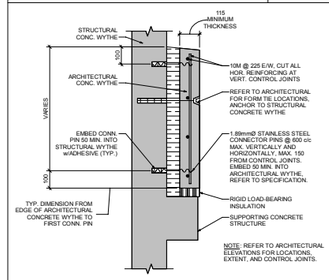
FOUNDATION DRAINAGE — CW08



WALL REINFORCEMENT AT ZONE OR COLUMN — CW09

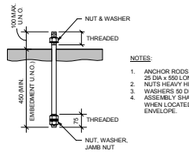


ARCHITECTURAL CONCRETE CLADDING — CW11



NOTE: REFER TO ARCHITECTURAL ELEVATIONS FOR LOCATIONS, EXTENT, AND CONTROL JOINTS.

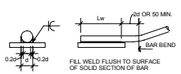
ANCHOR ROD — S01



NOTES:

1. ANCHOR RODS ASTMF1554 GRADE 55, 25 DIA x 550 LONG U.N.O.
2. NUTS HEAVY HEX STRUCTURAL
3. WASHERS 50 DIA x 3.5 THICK MIN.
4. ASSEMBLY SHALL BE GALVANIZED WHEN LOCATED OUTSIDE OF BUILDING ENVELOPE.

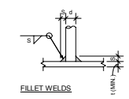
WELD DETAILS - DEFORMED BAR ANCHORS TO STEEL PLATE — S02



FLARE-BEVEL GROOVE WELDS

BAR NO.	Lw(mm)
10M	65
15M	90
20M	110
25M	140

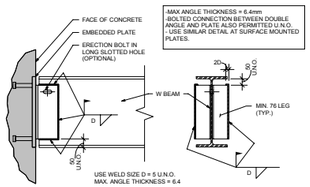
NOTE: USE E49XX ELECTRODES



FILLET WELDS

BAR NO.	S(mm)	t MIN.(mm)
10M	8	4
15M	10	6
20M	12	7
25M	16	10

W-BEAM TO EMBEDDED PLATE CONNECTION — S03



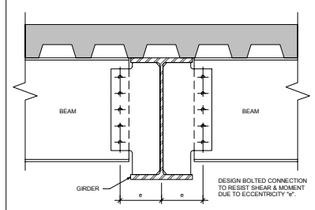
-MAX ANGLE THICKNESS = 6.4mm
-BOLTED CONNECTION BETWEEN DOUBLE ANGLE AND PLATE ALSO PERMITTED U.N.O.
-USE SIMILAR DETAIL AT SURFACE MOUNTED PLATES.

WEB FRAMING LEG WITH WELDS — OUTSTANDING LEG WITH WELDS

NOTE:
DESIGN SIMILAR BOLTED TYPE CONNECTIONS TO EMBED PLATES FOR ECCENTRICITY SPECIFIED IN S15.

TYPICAL STEEL BEAM /GIRDER ARRANGEMENT — S15

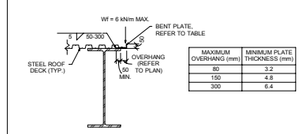
NOTE: BEAM TO COLUMN CONNECTION SHEAR TAB DESIGNED FOR SIMILAR ECCENTRICITIES.



DESIGN BOLTED CONNECTION TO RESIST SHEAR & MOMENT DUE TO ECCENTRICITY "e".

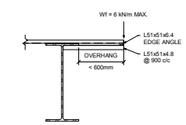
TYPICAL ROOF DECK EDGE DETAILS — S26

NOTE: PROVIDE L51x51 DECK EDGE AT ALL ROOF DECK PERIMETERS & OPENINGS U.N.O.

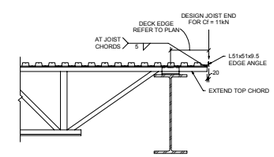


MAXIMUM OVERHANG (mm)	MINIMUM PLATE THICKNESS (mm)
80	3.2
150	4.8
300	6.4

DECK EDGE @ W-BEAM: SMALL OVERHANG

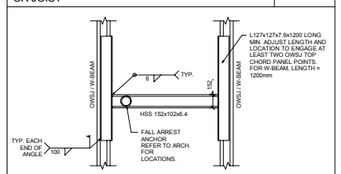


DECK EDGE @ W-BEAM: LARGE OVERHANG



DECK EDGE PERPENDICULAR TO JOIST SPAN (FOR JOIST CENTRES < 1.8m)

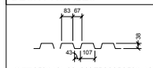
TYPICAL FALL RESTRAINT SECTION @ W-BEAM OR JOIST — S17



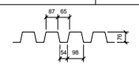
NOTES:

1. FOR CLARITY, STEEL DECK NOT SHOWN.
2. DO NOT MAKE WELDS TRANSVERSE TO JOIST CHORD OR W-BEAM. ONLY PARALLET WELDS PERMITTED
3. DESIGN OWSJ FOR ADDITIONAL 12kN REACTION AT END OF EACH ANGLE.
4. MAXIMUM HEIGHT OF FALL ARREST ANCHOR SHALL BE 500mm.

ROOF DECK AND COMPOSITE FLOOR DECK PROFILES — S06



38 mm DECK NON-COMPOSITE ROOF DECK AND COMPOSITE FLOOR DECK

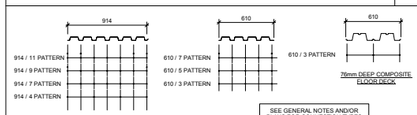


76 mm DECK COMPOSITE FLOOR DECK

NOTE:

1. STRUCTURAL DESIGN IS BASED ON THESE DECK PROFILES. USE THESE PROFILES WHEREVER THE DECK IS EXPOSED TO VIEW. THE USE OF AN ALTERNATE PROFILE REQUIRES ACCEPTANCE OF CONSULTANT.

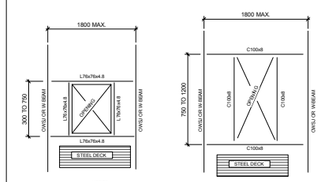
STEEL DECK DIAPHRAGM CONNECTION PATTERNS — S19



76mm DEEP COMPOSITE FLOOR DECK

SEE GENERAL NOTES AND/OR PLANS FOR CONNECTION TYPES

OPENING THROUGH METAL ROOF DECK — S20



NOTES:

1. FRAMING FOR ROOF DECK OPENINGS SIMILAR.
2. FRAMING FOR LARGER OPENINGS SHOWN ON PLAN DRAWINGS.

STEEL SUB FRAMING

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG™

Consultants Seal | Consultants Permit

Key Plan — NORTH

Issue

Letter	Date	By	Description
A	2013.02.15	RR	Issued for DD
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

Client Approval Date:

Dwg Title: **TYPICAL DETAILS SHEET 2 OF 2**

Building: **STUDENTS' UNION BUILDING #54400**

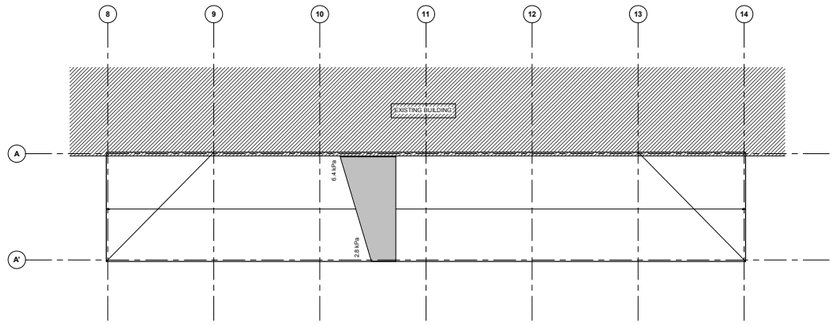
Job Number: XXX## | Work Order Number: #####

Arch ☐ Mech ☐ Elect ☐ Strct ■ | Drawn By: JS

Plot Date: 12/03/2013 11:49:17 AM | Issue: A | Revision:

Sheet | University Dwg Num

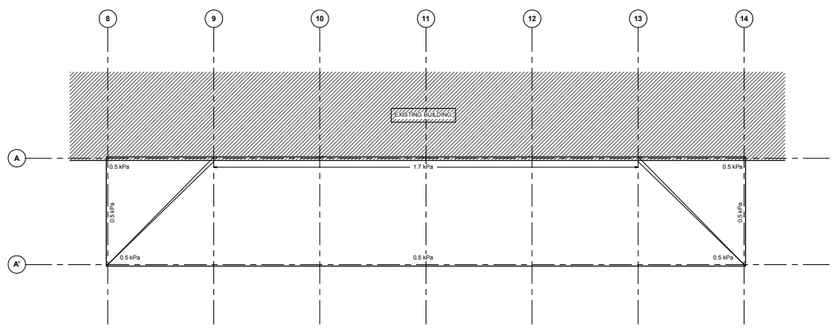
01257E02000 — **S0.03**



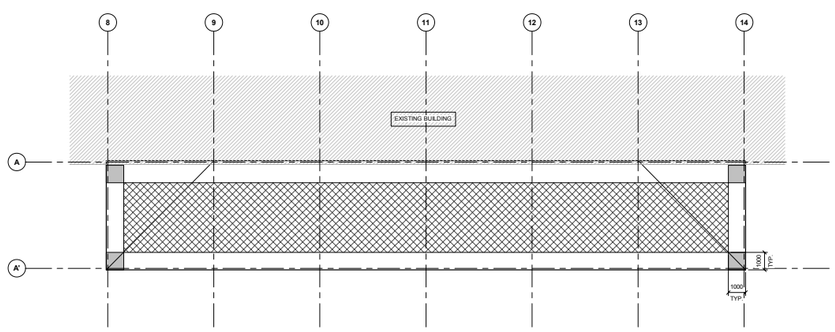
1 S0.10 **LOW ROOF SNOW LOADING DIAGRAM**
1 : 100

NOTES:

1. UNIFORM SPECIFIED SNOW LOADS ON ALL SURFACES = 1.46 kPa U.N.O.
2. LOADS ARE UN-FACTORED. IMPORTANCE FACTORS IN ABC 2006 TABLE 4.1.6.2. ARE NOT INCLUDED.



2 S0.10 **LOW ROOF RAIN PONDING LOADING DIAGRAM (UNFACTORED)**
1 : 100



3 S0.10 **LOW ROOF WIND NET UPLIFT DIAGRAM**
1 : 100

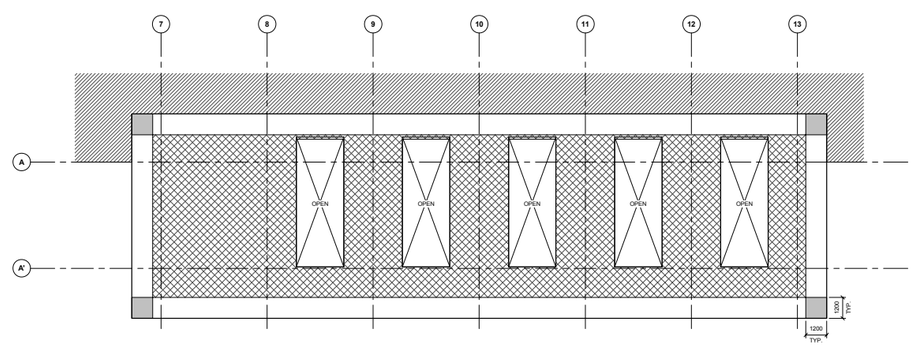
HATCH INDICATES -2.7 kPa (TYPICAL CORNER ZONES)

HATCH INDICATES -1.3 kPa

HATCH INDICATES -0.9 kPa

NOTES:

1. LOADS SHOWN REPRESENT NET FACTORED ULS DESIGN UPLIFT LOADS. DO NOT COMBINE WITH ANY OTHER LOADS.
2. FOR SLS DESIGN CONSIDERATIONS, INDICATED LOADS MAY BE MULTIPLIED BY 0.5 IN ACCORDANCE WITH ABC TABLE 4.1.7.1.



4 S0.10 **HIGH ROOF WIND NET UPLIFT DIAGRAM**
1 : 100

HATCH INDICATES -2.2 kPa (TYPICAL CORNER ZONES)

HATCH INDICATES -1.5 kPa

HATCH INDICATES -1.2 kPa

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG™

Consultants Seal | Consultants Permit

Key Plan — NORTH

Issue

Letter	Date	By	Description
A	2013.02.15	RR	Issued for DD
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: **STUDENTS' UNION BUILDING**

ADDITION AND RENOVATION

Client Approval Date

Dwg Title: **LOADING DIAGRAMS**

Building: **STUDENTS' UNION BUILDING #54400**

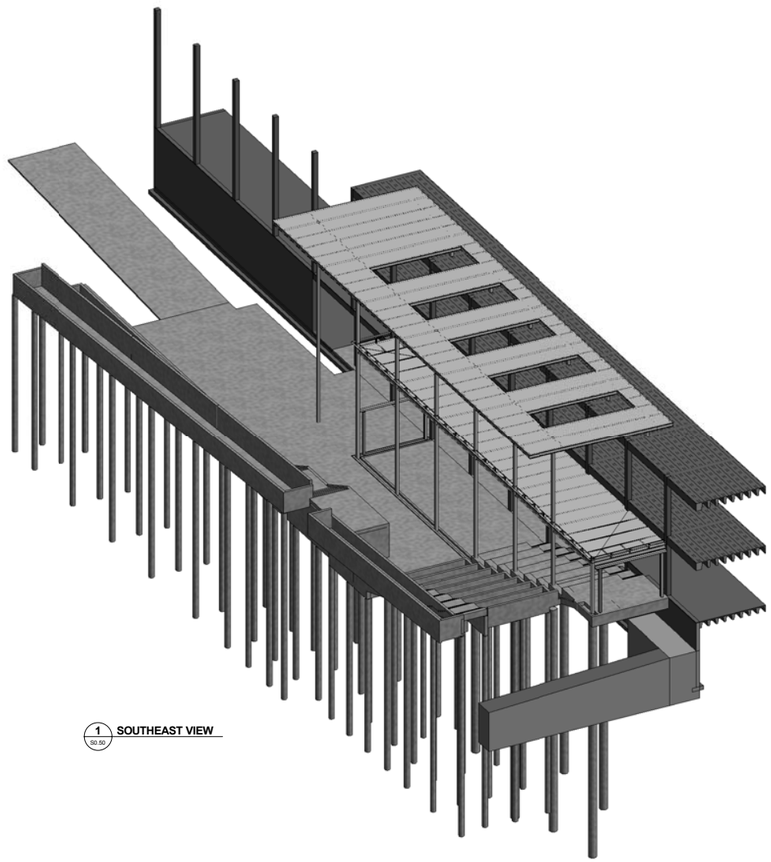
Job Number: **XXX##** | Work Order Number: **#####**

Arch ☐ Mech ☐ Elect ☐ Strct ■ | Drawn By: **JS**

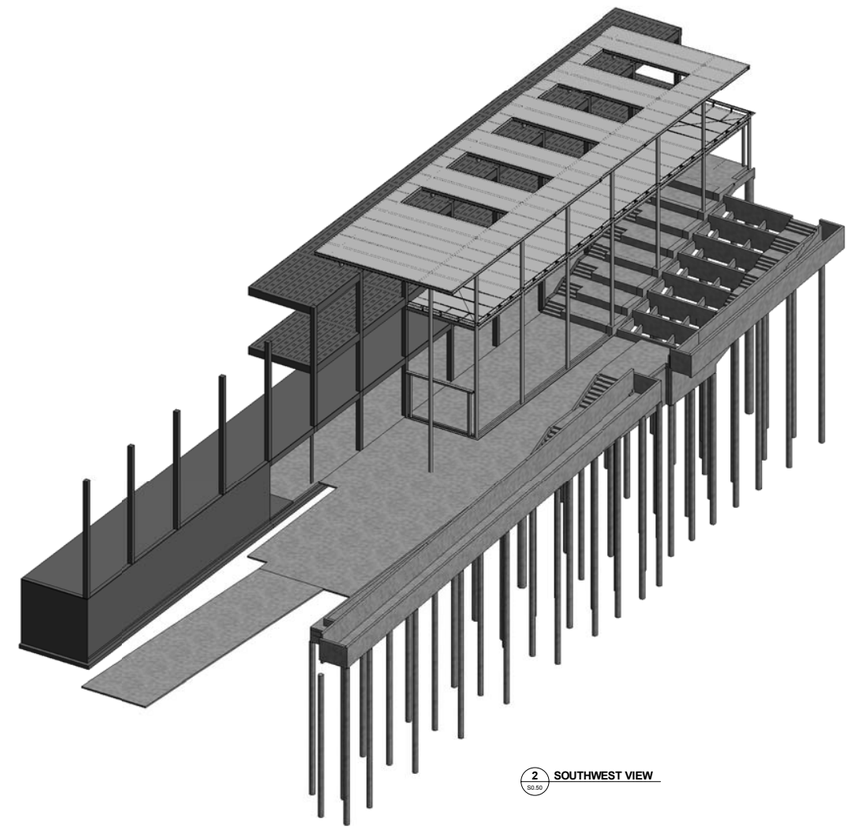
Plot Date: **12/03/2013 11:49:18 AM** | Issue: **A** | Revision

Sheet | University Dwg Num

01257E02000 | **S0.10**



1 S0.50 SOUTHEAST VIEW



2 S0.50 SOUTHWEST VIEW

3D VIEWS SHOW A LIMITED AMOUNT OF INFORMATION AND IS PROVIDED ONLY TO ILLUSTRATE OVERALL CONTEXT. REFER TO DRAWINGS AND SPECIFICATIONS FOR DETAILED INFORMATION

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant

DIALOG™

Consultants Seal

Consultants Permit

Key Plan

NORTH

Issue

Letter	Date	By	Description
A	2013.02.15	RR	Issued for DD
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

Client Approval Date

Dwg Title **3D VIEW**

Building **STUDENTS' UNION BUILDING #54400**

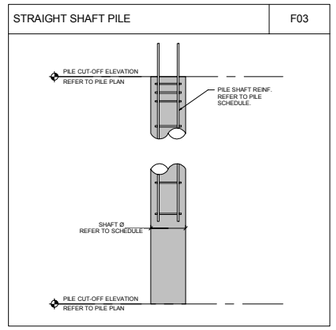
Job Number XXX## Work Order Number ####

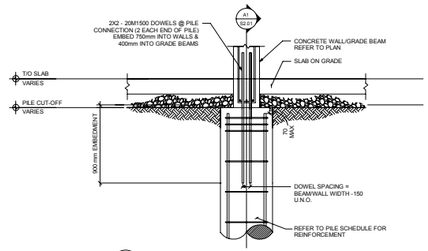
Arch ☐ Mech ☐ Elect ☐ Strct ■ Drawn By JS

Plot Date 12/03/2013 11:49:23 AM Issue A Revision

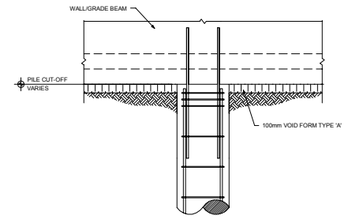
Sheet University Dwg Num

01257E02000 S0.50

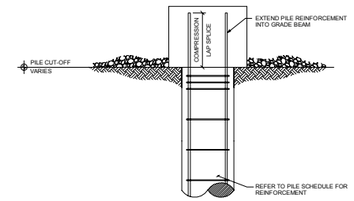




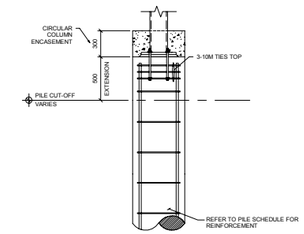
A S2.01 1 : 20 **T/O PILE @ FDN. WALL / GRADE BEAM**



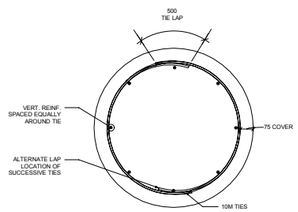
A1 S2.01 1 : 20 **SECTION - T/O PILE @ FDN. WALL / GRADE BEAM**



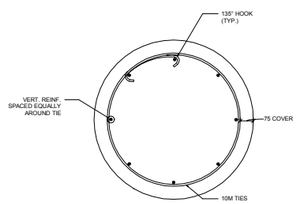
B S2.01 1 : 20 **T/O PILE @ WIDER GRADE BEAM / WALL**



C S2.01 1 : 20 **T/O PILE @ EXTERNAL COLUMN**



1 S2.01 1 : 10 **TYPICAL PILE SHAFT SECTION**



5 S2.01 1 : 10 **TYPICAL PILE CAP / EXTENSION SECTION**

NOTES: REQUIRED ADDITIONAL ALLOWANCES

DRAWINGS HAVE BEEN PREPARED TO SHOW THE STRUCTURAL INTENT WITH RESPECT TO THE PRIMARY FRAMING MEMBERS AND THE LATERAL LOAD RESISTING SYSTEM. SOME SECONDARY MISCELLANEOUS STRUCTURAL ELEMENTS ARE NOT SHOWN AT THIS STAGE. AN APPROPRIATE COST ALLOWANCE FOR THESE ITEMS SHOULD BE MADE AT THIS STAGE.

A NON-EXHAUSTIVE LIST OF THESE ELEMENTS IS AS FOLLOWS:

- THE FORMING OF MECHANICAL AND ELECTRICAL ROOMS AND OPENINGS/SUMPS ON THE BASEMENT FLOOR, INCLUDING PADS, CURBS AND SO FORTH.
- SPECIAL FRAMING AROUND MECHANICAL AND ELECTRICAL SHAFTS AND RISERS
- CAST-IN SUPPORTS AND POCKETS FOR EXTERIOR CLADDING, GLAZING, MECHANICAL EQUIPMENT/LOUVERS
- EXTERIOR STRUCTURES SUCH AS RETAINING WALLS, PLANTERS, WALKS, CURBS, AND SO FORTH NOT DETAILED ON STRUCTURAL DRAWINGS
- EXTERIOR STRUCTURAL SLABS, APRONS AND CANOPIES ADJACENT TO ENTRIES
- POTENTIAL INCREASED PILE DEPTHS DUE TO UNANTICIPATED SOIL CONDITIONS
- PENETRATIONS FOR MECHANICAL AND ELECTRICAL SERVICES
- SLOPED ROOF STEEL AT 2%
- FALL ARREST POSTS
- COMPLEXITIES ASSOCIATED WITH INSTALLING IN-FLOOR HEATING TUBES IN STRUCTURAL AND NON-STRUCTURAL SLABS ON GRADE
- ROOF ACCESS LADDERS/STAIRS

PILE SCHEDULE					
Mark	PILE BASE ELEVATION (mm)	FACTORED COMPRESSIVE CAPACITY (kN)	SHAFT Ø (mm)	VERT. REINF.	TIE REINF.
P2	82000	295	406	5-15M9000	3-10M @ 75 TOP, 10M @ 340 REM.
P3	88000	170	610	5-20M9000	3-10M @ 75 TOP, 10M @ 320 REM.
P4	80000	540	610	5-20M9000	3-10M @ 75 TOP, 10M @ 320 REM.

PILE LEGEND:

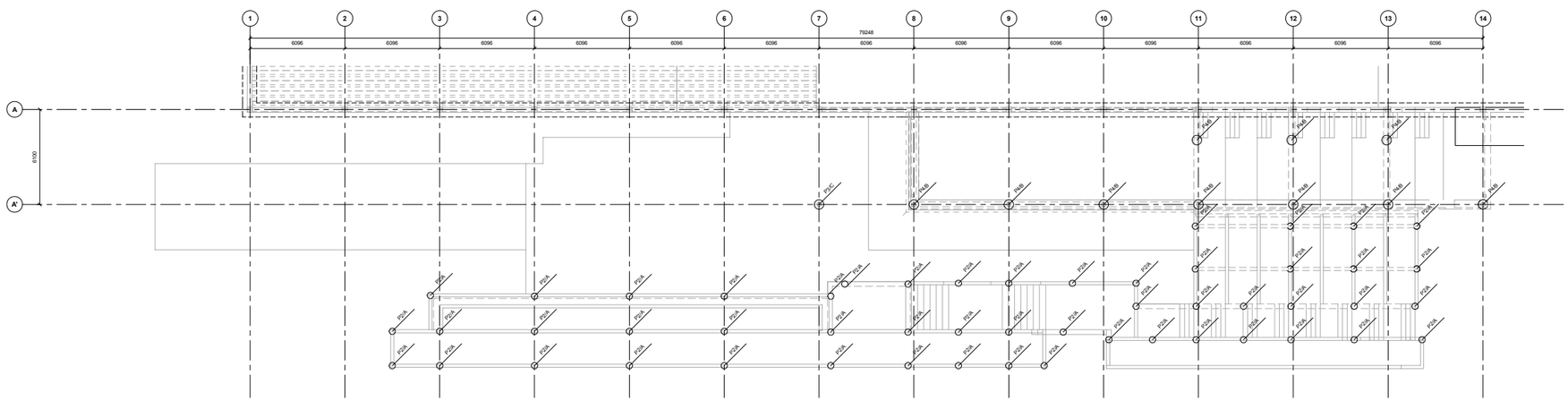
PILE MARK
REFER TO SCHEDULE
TOP OF PILE DETAIL MARK
REFER S2.01 FOR DETAILS
PILE CUT-OFF ELEVATION

PILE NOTES:

1. BASIS FOR PILE DESIGN IS CAST-IN-PLACE CONCRETE PILES USING RECOMMENDED VALUES IN GEOTECHNICAL REPORT. TRADITIONAL AUGERED STRAIGHT SHAFT PILES OR CONTINUOUS FLIGHT AUGER (CFA) PILES ACCEPTABLE. NOTE LIKELYHOOD FOR CASING IF THE FORMER IS USED PER GEOTECHNICAL REPORT.
2. PILE CAPACITIES TABULATED BASED ON FACTORED SKIN FRICTION RESISTANCE OF CFA CONCRETE PILES:

   4.5m - 6.0m BGL 0 kPa
   6.0m - 10.5m BGL 12 kPa
   > 10.5m BGL 24 kPa
3. OBTAIN REVIEW OF ALL BEARING SURFACES BY A QUALIFIED GEOTECHNICAL ENGINEER REGISTERED IN ALBERTA.
4. FOR ADJACENT PILES (WITHIN CENTRE-TO-CENTRE DISTANCE SHAFT DIAMETER PLUS 2400), CONSTRUCT FIRST THE PILE WITH THE LOWEST BASE ELEVATION.
5. EXTEND SHAFT REINFORCEMENT TO WITHIN 100mm OF THE TOP OF THE PILE, PILE EXTENSION OR PILE CAP (U.N.O.).

NOTE: ALLOW FOR ADDITIONAL 10-P2 & 5-P4 PILES AT THIS STAGE TO ALLOW FOR ELEMENTS NOT DETAILED ON DRAWINGS.



3 S2.01 1 : 100 **PILE PLAN**

UNIVERSITY OF ALBERTA
PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG

Consultants Seal | Consultants Permit

Key Plan — NORTH

Issue

Letter	Date	By	Description
A	2013.02.15	RR	Issued for DD
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: STUDENTS' UNION BUILDING

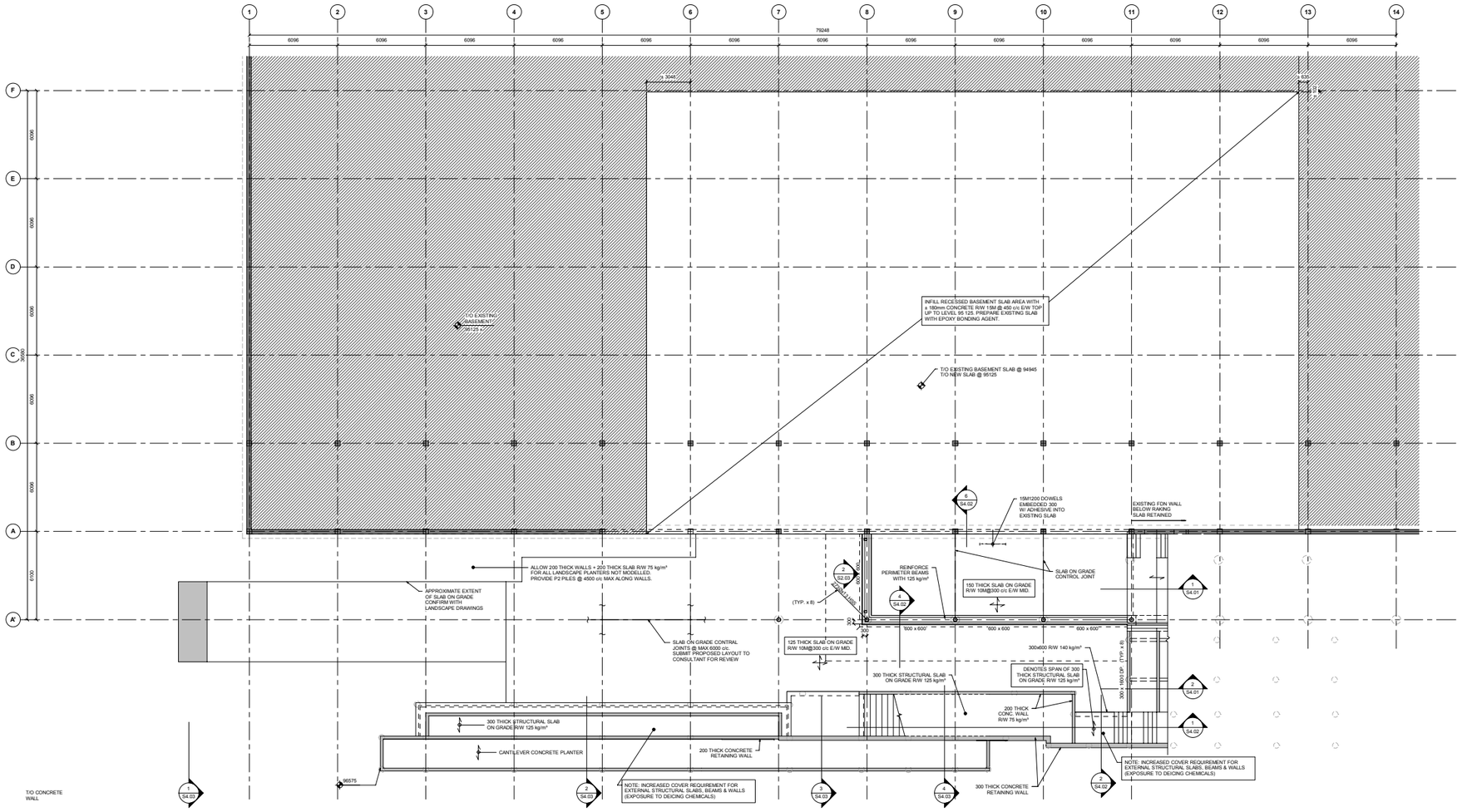
ADDITION AND RENOVATION

Client Approval Date:

Dwg Title: **PILE/FOOTING PLAN**

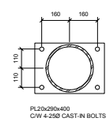
Building: **STUDENTS' UNION BUILDING #54400**

Job Number: XXX## | Work Order Number: #####
Arch ☐ Mech ☐ Elect ☐ Strct ■ | Drawn By: JS
Plot Date: 12/03/2013 11:49:24 AM | Issue: A | Revision:
Sheet | University Dwg Num
01257E02000 | S2.01



1 / S2.02 BASEMENT PLAN

1 : 100



2 / S2.02 TYPICAL COLUMN BASE PLATE

1 : 10

STEEL COLUMN LEGEND:

COLUMN SIZE — BASE PLATE TYPE MARK REFER SX.XX FOR DETAILS

U/S BASE PLATE ASSEMBLY ELEVATION

NOTES: REQUIRED ADDITIONAL ALLOWANCES

DRAWINGS HAVE BEEN PREPARED TO SHOW THE STRUCTURAL INTENT WITH RESPECT TO THE PRIMARY FRAMING MEMBERS AND THE LATERAL LOAD RESISTING SYSTEM. SOME SECONDARY MISCELLANEOUS STRUCTURAL ELEMENTS ARE NOT SHOWN AT THIS STAGE. AN APPROPRIATE COST ALLOWANCE FOR THESE ITEMS SHOULD BE MADE AT THIS STAGE.

A NON-EXHAUSTIVE LIST OF THESE ELEMENTS IS AS FOLLOWS:

- THE FORMING OF MECHANICAL AND ELECTRICAL ROOMS AND OPENINGS/SUMPS ON THE BASEMENT FLOOR, INCLUDING PADS, CURBS AND SO FORTH.
- SPECIAL FRAMING AROUND MECHANICAL AND ELECTRICAL SHAFTS AND RISERS
- CAST-IN SUPPORTS AND POCKETS FOR EXTERIOR CLADDING, GLAZING, MECHANICAL EQUIPMENT/LOUVERS
- EXTERIOR STRUCTURES SUCH AS RETAINING WALLS, PLANTERS, WALKS, CURBS, AND SO FORTH NOT DETAILED ON STRUCTURAL DRAWINGS
- EXTERIOR STRUCTURAL SLABS, APRONS AND CANOPIES ADJACENT TO ENTRIES
- POTENTIAL INCREASED PILE DEPTHS DUE TO UNANTICIPATED SOIL CONDITIONS
- PENETRATIONS FOR MECHANICAL AND ELECTRICAL SERVICES
- SLOPED ROOF STEEL AT 2%
- FALL ARREST POSTS
- COMPLEXITIES ASSOCIATED WITH INSTALLING IN-FLOOR HEATING TUBES IN STRUCTURAL AND NON-STRUCTURAL SLABS ON GRADE
- ROOF ACCESS LADDERS/STAIRS

UNIVERSITY OF ALBERTA
PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG™

Consultants Seal | Consultants Permit

Key Plan — NORTH

Issue

Letter	Date	By	Description
A	2013.02.15	RR	Issued for DD
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: STUDENTS' UNION BUILDING

Client Approval Date

ADDITION AND RENOVATION

Dwg Title: **BASEMENT FRAMING PLAN**

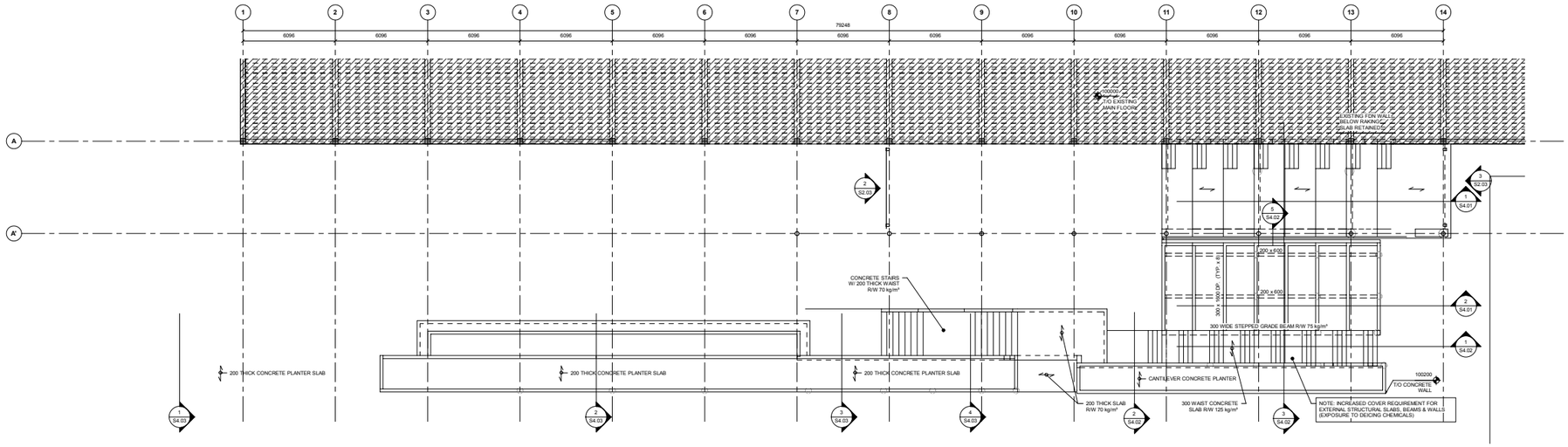
Building: **STUDENTS' UNION BUILDING #54400**

Job Number: XXX## | Work Order Number: #####

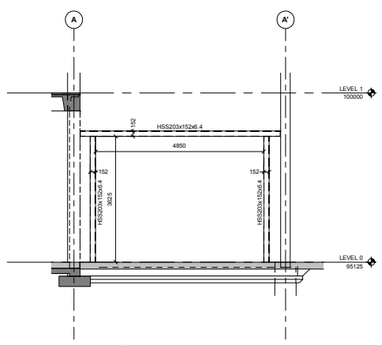
Arch ☐ Mech ☐ Elect ☐ Strct ■ | Drawn By: JS

Plot Date: 12/03/2013 11:49:25 AM | Issue: A | Revision

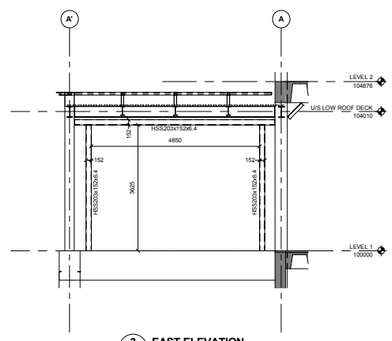
Sheet: 01257E02000 | University Dwg Num: S2.02



1 52.03 **MAIN FLOOR FRAMING PLAN**
1 : 100



2 52.03 **WEST ELEVATION**
1 : 50



3 52.03 **EAST ELEVATION**
1 : 50

NOTES: REQUIRED ADDITIONAL ALLOWANCES

DRAWINGS HAVE BEEN PREPARED TO SHOW THE STRUCTURAL INTENT WITH RESPECT TO THE PRIMARY FRAMING MEMBERS AND THE LATERAL LOAD RESISTING SYSTEM. SOME SECONDARY MISCELLANEOUS STRUCTURAL ELEMENTS ARE NOT SHOWN AT THIS STAGE. AN APPROPRIATE COST ALLOWANCE FOR THESE ITEMS SHOULD BE MADE AT THIS STAGE.

A NON-EXHAUSTIVE LIST OF THESE ELEMENTS IS AS FOLLOWS:

- THE FORMING OF MECHANICAL AND ELECTRICAL ROOMS AND OPENINGS/SUMPS ON THE BASEMENT FLOOR, INCLUDING PADS, CURBS AND SO FORTH.
- SPECIAL FRAMING AROUND MECHANICAL AND ELECTRICAL SHAFTS AND RISERS
- CAST-IN SUPPORTS AND POCKETS FOR EXTERIOR CLADDING, GLAZING, MECHANICAL EQUIPMENT/LOUVERS
- EXTERIOR STRUCTURES SUCH AS RETAINING WALLS, PLANTERS, WALKS, CURBS, AND SO FORTH NOT DETAILED ON STRUCTURAL DRAWINGS
- EXTERIOR STRUCTURAL SLABS, APRONS AND CANOPIES ADJACENT TO ENTRIES
- POTENTIAL INCREASED PILE DEPTHS DUE TO UNANTICIPATED SOIL CONDITIONS
- PENETRATIONS FOR MECHANICAL AND ELECTRICAL SERVICES
- SLOPED ROOF STEEL AT 2%
- FALL ARREST POSTS
- COMPLEXITIES ASSOCIATED WITH INSTALLING IN-FLOOR HEATING TUBES IN STRUCTURAL AND NON-STRUCTURAL SLABS ON GRADE
- ROOF ACCESS LADDERS/STAIRS

UNIVERSITY OF ALBERTA
PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG™

Consultants Seal | Consultants Permit

Key Plan — NORTH

Issue

Letter	Date	By	Description
A	2013.02.15	RR	Issued for DD
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: **STUDENTS' UNION BUILDING**

ADDITION AND RENOVATION

Client Approval Date

Dwg Title: **MAIN FLOOR FRAMING PLAN**

Building: **STUDENTS' UNION BUILDING #54400**

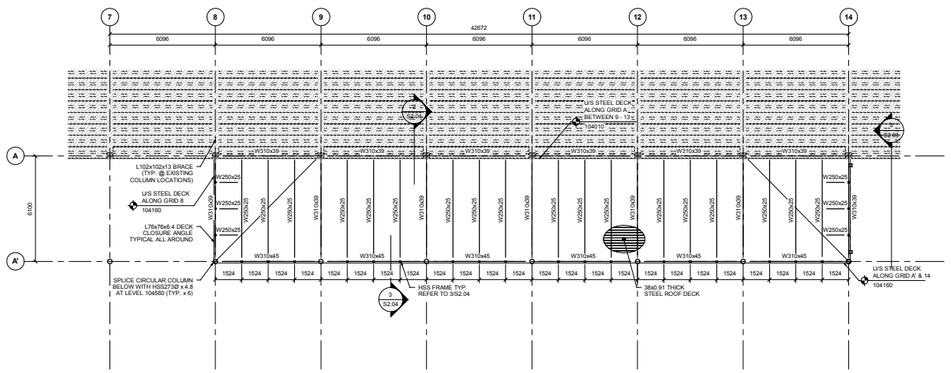
Job Number: **XXX##** | Work Order Number: **####**

Arch ☐ Mech ☐ Elect ☐ Strct ■ | Drawn By: **JS**

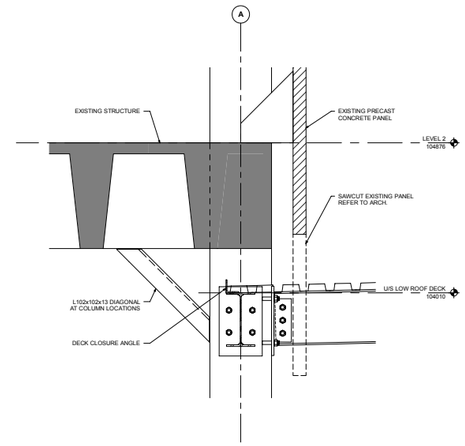
Plot Date: **12/03/2013 11:49:26 AM** | Issue: **A** | Revision

Sheet | University Dwg Num

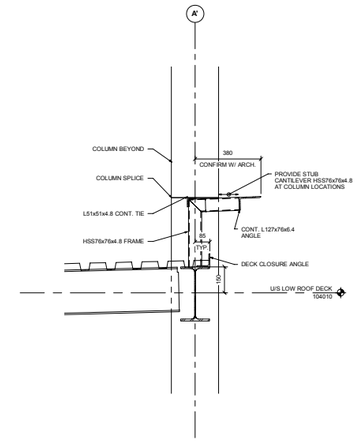
01257E02000 **S2.03**



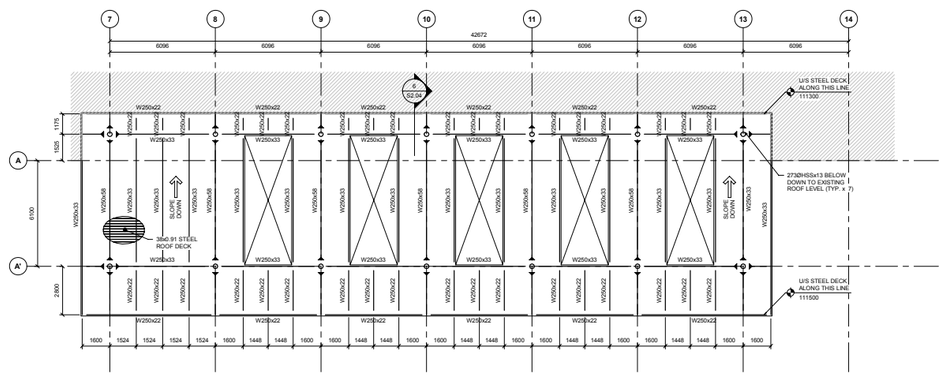
1 52.04 **U/S LOW ROOF DECK**
1 : 100



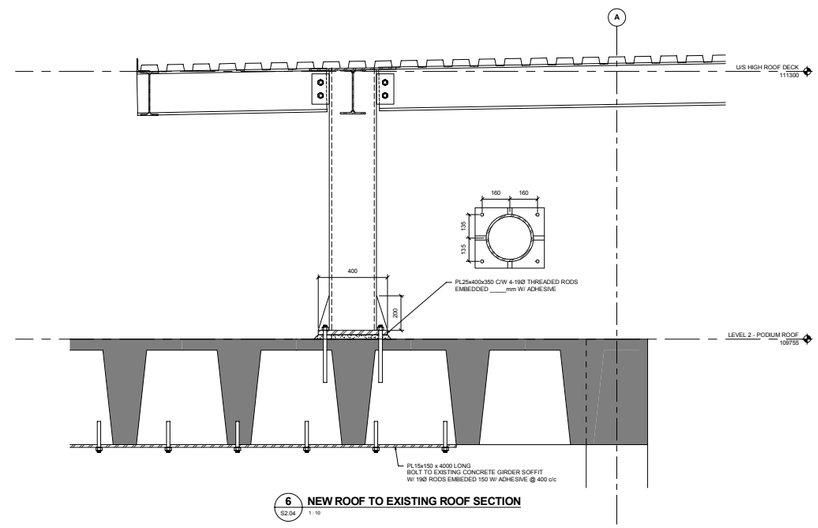
2 52.04 **NEW ROOF TO EXISTING FLOOR SECTION**
1 : 10



3 52.04 **HSS FRAME DETAIL**
1 : 10



5 52.04 **U/S HIGH ROOF DECK**
1 : 100



6 52.04 **NEW ROOF TO EXISTING ROOF SECTION**
1 : 10

NOTES: REQUIRED ADDITIONAL ALLOWANCES

DRAWINGS HAVE BEEN PREPARED TO SHOW THE STRUCTURAL INTENT WITH RESPECT TO THE PRIMARY FRAMING MEMBERS AND THE LATERAL LOAD RESISTING SYSTEM. SOME SECONDARY MISCELLANEOUS STRUCTURAL ELEMENTS ARE NOT SHOWN AT THIS STAGE. AN APPROPRIATE COST ALLOWANCE FOR THESE ITEMS SHOULD BE MADE AT THIS STAGE.

A NON-EXHAUSTIVE LIST OF THESE ELEMENTS IS AS FOLLOWS:

- THE FORMING OF MECHANICAL AND ELECTRICAL ROOMS AND OPENINGS/SUMPS ON THE BASEMENT FLOOR, INCLUDING PADS, CURBS AND SO FORTH.
- SPECIAL FRAMING AROUND MECHANICAL AND ELECTRICAL SHAFTS AND RISERS
- CAST-IN SUPPORTS AND POCKETS FOR EXTERIOR CLADDING, GLAZING, MECHANICAL EQUIPMENT/LOUVERS
- EXTERIOR STRUCTURES SUCH AS RETAINING WALLS, PLANTERS, WALKS, CURBS, AND SO FORTH NOT DETAILED ON STRUCTURAL DRAWINGS
- EXTERIOR STRUCTURAL SLABS, APRONS AND CANOPIES ADJACENT TO ENTRIES
- POTENTIAL INCREASED PILE DEPTHS DUE TO UNANTICIPATED SOIL CONDITIONS
- PENETRATIONS FOR MECHANICAL AND ELECTRICAL SERVICES
- SLOPED ROOF STEEL AT 2%
- FALL ARREST POSTS
- COMPLEXITIES ASSOCIATED WITH INSTALLING IN-FLOOR HEATING TUBES IN STRUCTURAL AND NON-STRUCTURAL SLABS ON GRADE
- ROOF ACCESS LADDERS/STAIRS

UNIVERSITY OF ALBERTA
PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG

Consultants Seal | Consultants Permit

Key Plan — NORTH

Issue

Letter	Date	By	Description
A	2013.02.15	RR	Issued for DD
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: **STUDENTS' UNION BUILDING**

ADDITION AND RENOVATION

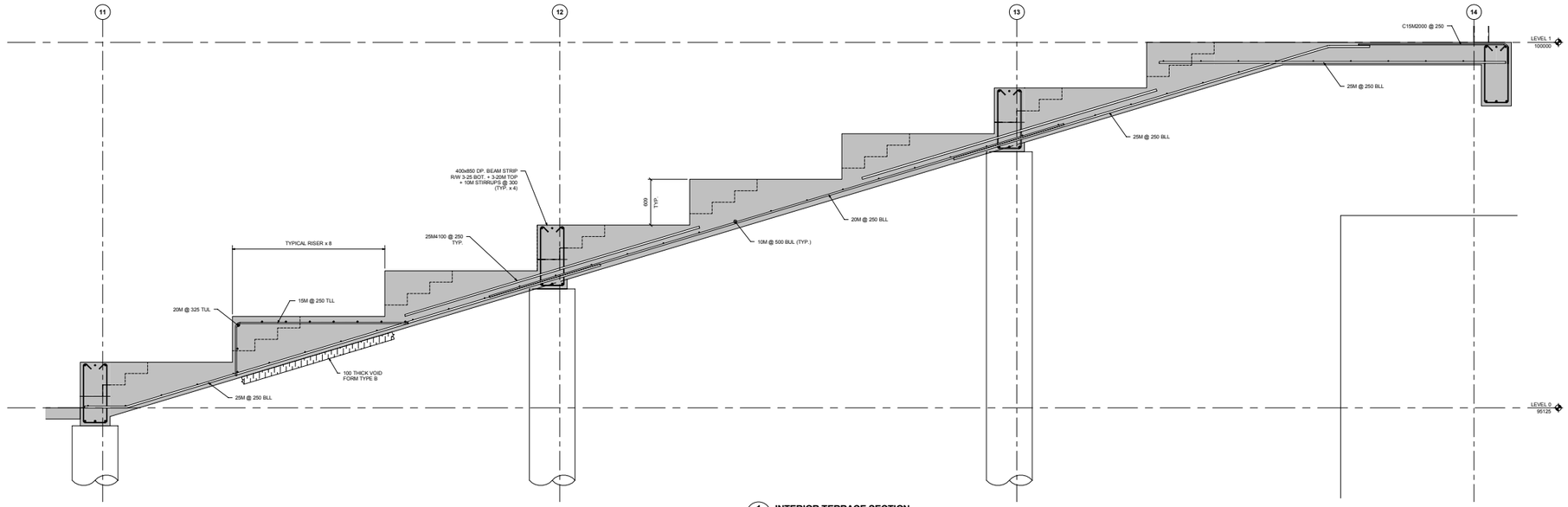
Client Approval Date

Dwg Title: **ROOF FRAMING PLAN**

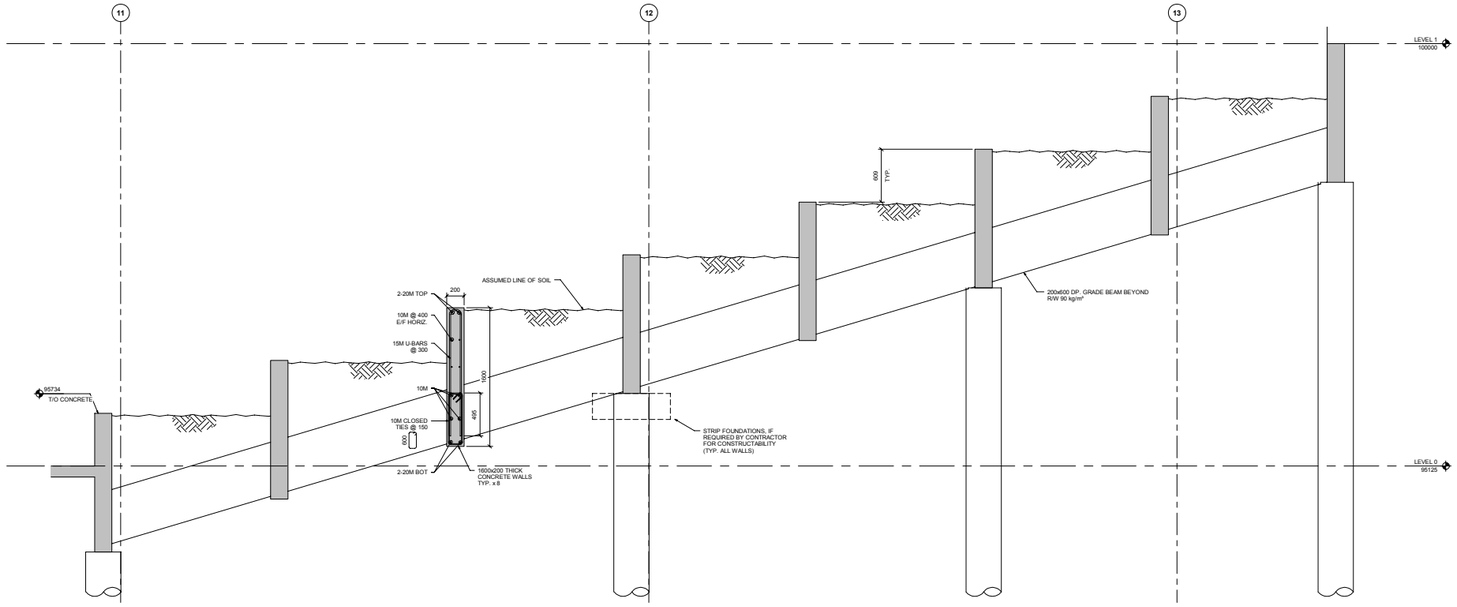
Building: **STUDENTS' UNION BUILDING #54400**

Job Number	XXX##	Work Order Number	#####
Arch ☐ Mech ☐ Elect ☐ Strct ■		Drawn By	JS
Plot Date	12/03/2013 11:49:28 AM	Issue	A
Sheet		University Dwg Num	

01257E02000 **S2.04**



1 S4.01 **INTERIOR TERRACE SECTION**
1 : 20



2 S4.01 **LANDSCAPE TIERS SECTION**
1 : 20

NOTES: REQUIRED ADDITIONAL ALLOWANCES

DRAWINGS HAVE BEEN PREPARED TO SHOW THE STRUCTURAL INTENT WITH RESPECT TO THE PRIMARY FRAMING MEMBERS AND THE LATERAL LOAD RESISTING SYSTEM. SOME SECONDARY MISCELLANEOUS STRUCTURAL ELEMENTS ARE NOT SHOWN AT THIS STAGE. AN APPROPRIATE COST ALLOWANCE FOR THESE ITEMS SHOULD BE MADE AT THIS STAGE.

A NON-EXHAUSTIVE LIST OF THESE ELEMENTS IS AS FOLLOWS:

- THE FORMING OF MECHANICAL AND ELECTRICAL ROOMS AND OPENINGS/SUMPS ON THE BASEMENT FLOOR, INCLUDING PADS, CURBS AND SO FORTH.
- SPECIAL FRAMING AROUND MECHANICAL AND ELECTRICAL SHAFTS AND RISERS
- CAST-IN SUPPORTS AND POCKETS FOR EXTERIOR CLADDING, GLAZING, MECHANICAL EQUIPMENT/LOUVERS
- EXTERIOR STRUCTURES SUCH AS RETAINING WALLS, PLANTERS, WALKS, CURBS, AND SO FORTH NOT DETAILED ON STRUCTURAL DRAWINGS
- EXTERIOR STRUCTURAL SLABS, APRONS AND CANOPIES ADJACENT TO ENTRIES
- POTENTIAL INCREASED PILE DEPTHS DUE TO UNANTICIPATED SOIL CONDITIONS
- PENETRATIONS FOR MECHANICAL AND ELECTRICAL SERVICES
- SLOPED ROOF STEEL AT 2%
- FALL ARREST POSTS
- COMPLEXITIES ASSOCIATED WITH INSTALLING IN-FLOOR HEATING TUBES IN STRUCTURAL AND NON-STRUCTURAL SLABS ON GRADE
- ROOF ACCESS LADDERS/STAIRS

UNIVERSITY OF ALBERTA
PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG™

Consultants Seal | Consultants Permit

Key Plan — NORTH

Issue

Letter	Date	By	Description
A	2013.02.15	RR	Issued for DD
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

Client Approval Date

Dwg Title: **SUBSTRUCTURE SECTIONS & DETAILS**

Building: **STUDENTS' UNION BUILDING #54400**

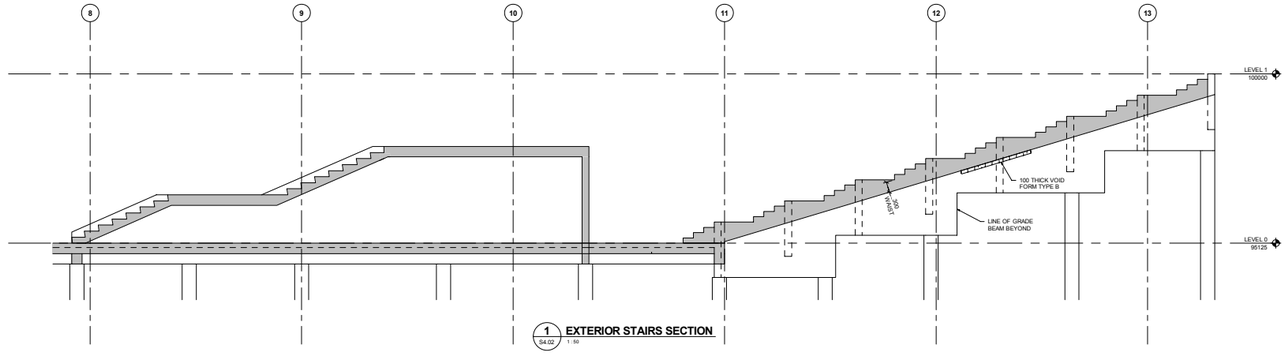
Job Number: XXX## | Work Order Number: #####

Arch ☐ Mech ☐ Elect ☐ Strct ■ | Drawn By: JS

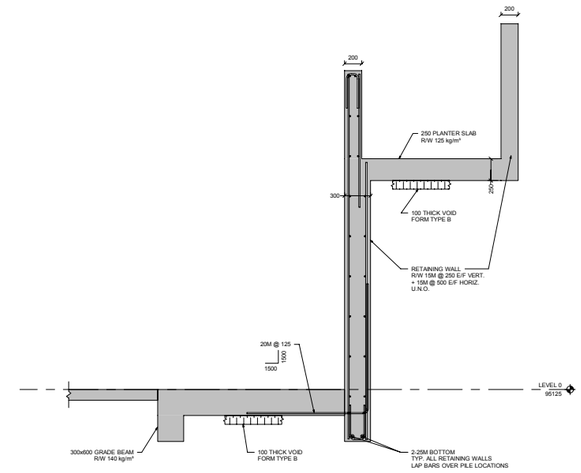
Plot Date: 12/03/2013 11:49:29 AM | Issue: A | Revision:

Sheet | University Dwg Num

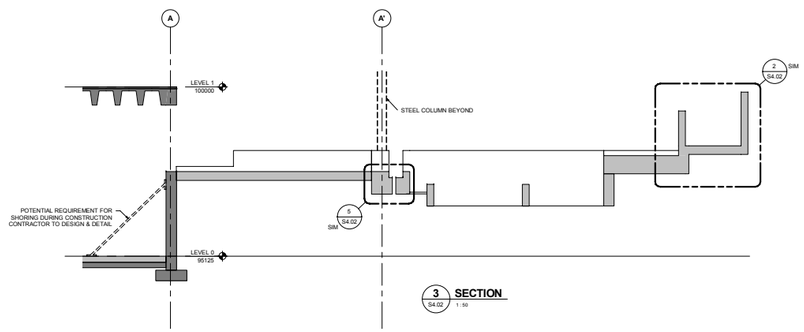
01257E02000 **S4.01**



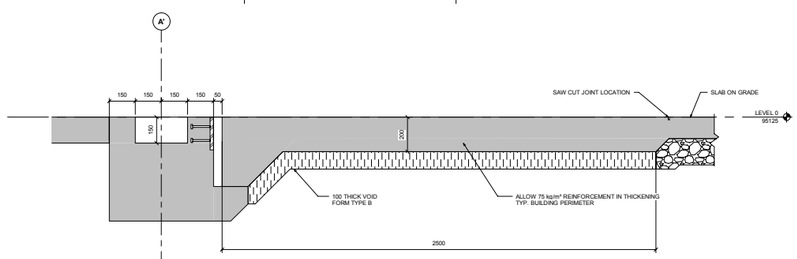
1 S4.02 **EXTERIOR STAIRS SECTION**
1 : 50



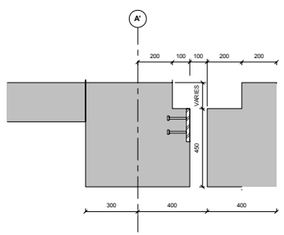
2 S4.02 **PLANTER SECTION**
1 : 25



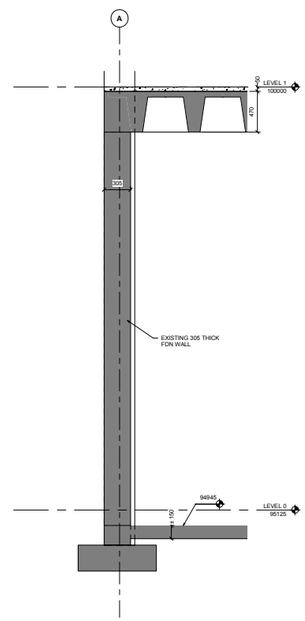
3 S4.02 **SECTION**
1 : 50



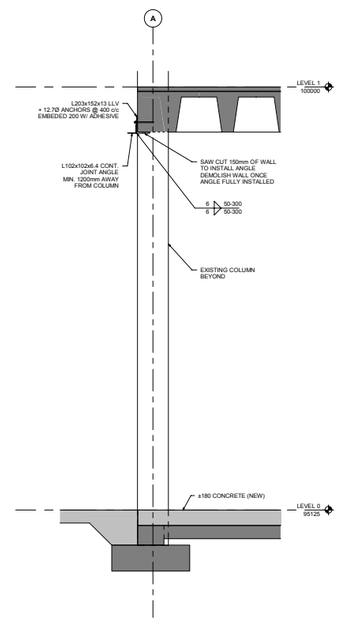
4 S4.02 **GRADE BEAM SECTION @ BASEMENT**
1 : 10



5 S4.02 **GRADE BEAM SECTION @ TERRACE**
1 : 10



6A S4.02 **EDGE SECTION - EXISTING CONDITIONS**
1 : 20



6 S4.02 **EDGE SECTION - NEW**
1 : 20

NOTES: REQUIRED ADDITIONAL ALLOWANCES

DRAWINGS HAVE BEEN PREPARED TO SHOW THE STRUCTURAL INTENT WITH RESPECT TO THE PRIMARY FRAMING MEMBERS AND THE LATERAL LOAD RESISTING SYSTEM. SOME SECONDARY MISCELLANEOUS STRUCTURAL ELEMENTS ARE NOT SHOWN AT THIS STAGE. AN APPROPRIATE COST ALLOWANCE FOR THESE ITEMS SHOULD BE MADE AT THIS STAGE.

A NON-EXHAUSTIVE LIST OF THESE ELEMENTS IS AS FOLLOWS:

- THE FORMING OF MECHANICAL AND ELECTRICAL ROOMS AND OPENINGS/SUMPS ON THE BASEMENT FLOOR, INCLUDING PADS, CURBS AND SO FORTH.
- SPECIAL FRAMING AROUND MECHANICAL AND ELECTRICAL SHAFTS AND RISERS
- CAST-IN SUPPORTS AND POCKETS FOR EXTERIOR CLADDING, GLAZING, MECHANICAL EQUIPMENT/LOUVERS
- EXTERIOR STRUCTURES SUCH AS RETAINING WALLS, PLANTERS, WALKS, CURBS, AND SO FORTH NOT DETAILED ON STRUCTURAL DRAWINGS
- EXTERIOR STRUCTURAL SLABS, APRONS AND CANOPIES ADJACENT TO ENTRIES
- POTENTIAL INCREASED PILE DEPTHS DUE TO UNANTICIPATED SOIL CONDITIONS
- PENETRATIONS FOR MECHANICAL AND ELECTRICAL SERVICES
- SLOPED ROOF STEEL AT 2%
- FALL ARREST POSTS
- COMPLEXITIES ASSOCIATED WITH INSTALLING IN-FLOOR HEATING TUBES IN STRUCTURAL AND NON-STRUCTURAL SLABS ON GRADE
- ROOF ACCESS LADDERS/STAIRS

UNIVERSITY OF ALBERTA
PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG™

Consultants Seal | Consultants Permit

Key Plan — NORTH

Issue

Letter	Date	By	Description
A	2013.02.15	RR	Issued for DD
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: **STUDENTS' UNION BUILDING**

ADDITION AND RENOVATION

Client Approval Date:

Dwg Title: **SUBSTRUCTURE SECTIONS & DETAILS**

Building: **STUDENTS' UNION BUILDING #54400**

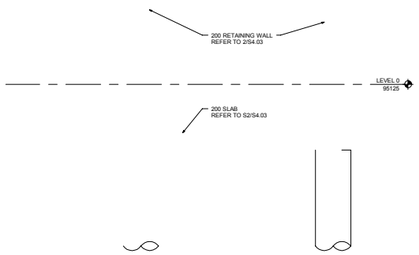
Job Number: **XXX##** | Work Order Number: **#####**

Arch ☐ Mech ☐ Elect ☐ Strct ■ | Drawn By: **JS**

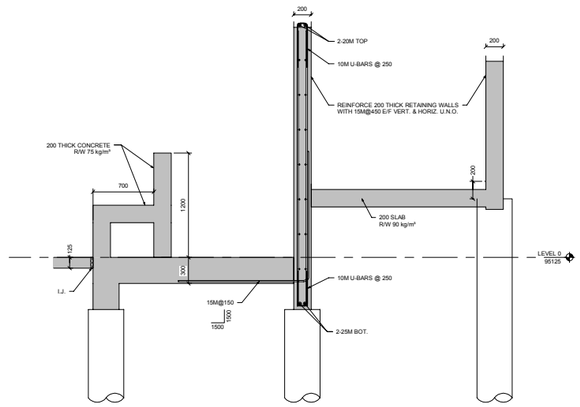
Plot Date: **12/03/2013 11:49:40 AM** | Issue: **A** | Revision:

Sheet: | University Dwg Num:

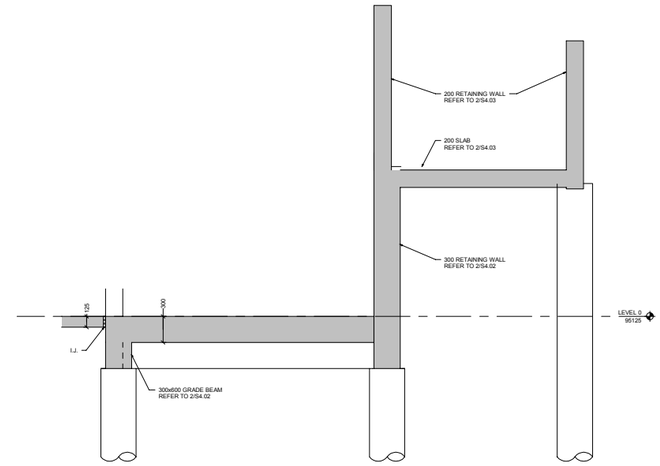
01257E02000 **S4.02**



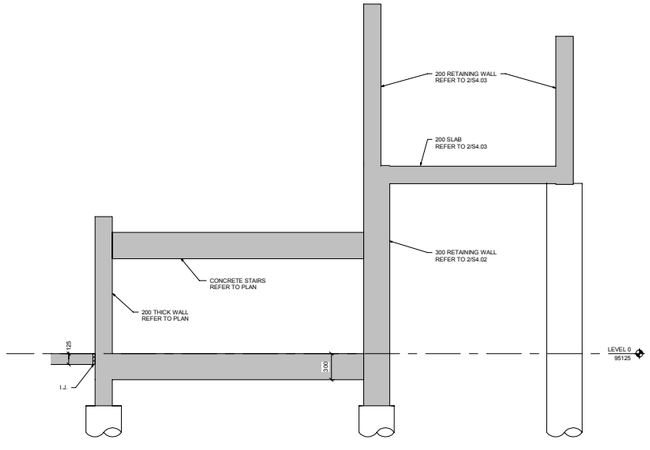
1 SECTION
S4.03 1 : 20



2 SECTION
S4.03 1 : 20



3 SECTION
S4.03 1 : 20



4 SECTION
S4.03 1 : 20

NOTES: REQUIRED ADDITIONAL ALLOWANCES

DRAWINGS HAVE BEEN PREPARED TO SHOW THE STRUCTURAL INTENT WITH RESPECT TO THE PRIMARY FRAMING MEMBERS AND THE LATERAL LOAD RESISTING SYSTEM. SOME SECONDARY MISCELLANEOUS STRUCTURAL ELEMENTS ARE NOT SHOWN AT THIS STAGE. AN APPROPRIATE COST ALLOWANCE FOR THESE ITEMS SHOULD BE MADE AT THIS STAGE.

A NON-EXHAUSTIVE LIST OF THESE ELEMENTS IS AS FOLLOWS:

- THE FORMING OF MECHANICAL AND ELECTRICAL ROOMS AND OPENINGS/SUMPS ON THE BASEMENT FLOOR, INCLUDING PADS, CURBS AND SO FORTH.
- SPECIAL FRAMING AROUND MECHANICAL AND ELECTRICAL SHAFTS AND RISERS
- CAST-IN SUPPORTS AND POCKETS FOR EXTERIOR CLADDING, GLAZING, MECHANICAL EQUIPMENT/LOUVERS
- EXTERIOR STRUCTURES SUCH AS RETAINING WALLS, PLANTERS, WALKS, CURBS, AND SO FORTH NOT DETAILED ON STRUCTURAL DRAWINGS
- EXTERIOR STRUCTURAL SLABS, APRONS AND CANOPIES ADJACENT TO ENTRIES
- POTENTIAL INCREASED PILE DEPTHS DUE TO UNANTICIPATED SOIL CONDITIONS
- PENETRATIONS FOR MECHANICAL AND ELECTRICAL SERVICES
- SLOPED ROOF STEEL AT 2%
- FALL ARREST POSTS
- COMPLEXITIES ASSOCIATED WITH INSTALLING IN-FLOOR HEATING TUBES IN STRUCTURAL AND NON-STRUCTURAL SLABS ON GRADE
- ROOF ACCESS LADDERS/STAIRS

UNIVERSITY OF ALBERTA
PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant
DIALOG™

Consultants Seal | Consultants Permit

Key Plan
NORTH

Issue

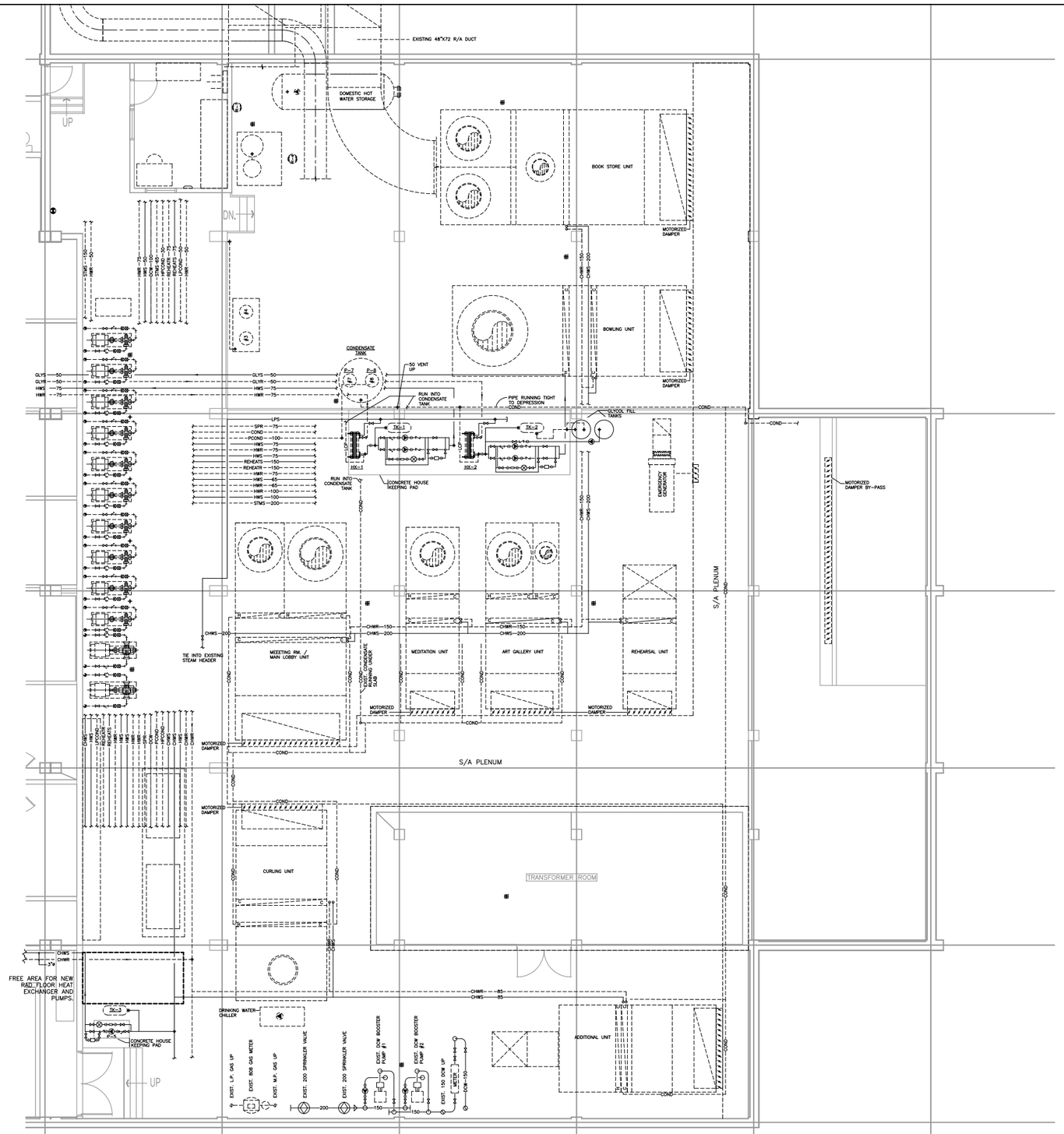
Letter	Date	By	Description
A	2013.02.15	RR	Issued for DD
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department STUDENTS' UNION BUILDING
ADDITION AND RENOVATION
Client Approval Date
Dwg Title **SUBSTRUCTURE SECTIONS & DETAILS**
Building **STUDENTS' UNION BUILDING #54400**

Job Number XXX## | Work Order Number #####
Arch ☐ Mech ☐ Elect ☐ Strct ■ | Drawn By JS
Plot Date 12/03/2013 11:49:41 AM | Issue A | Revision
Sheet | University Dwg Num
01257E02000 | S4.03



1 M1 LARGE SCALE MECHANICAL ROOM

SCALE: 1:50

C:\Autotemp\01257E\01\3 DESIGN\DESIGN\Draft Reports\25%Report 2013-02-15\M1 - Mech Rm.dwg

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG

Consultants Seal | Consultants Permit

Key Plan — NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

Client Approval Date

Dwg Title: **LARGE SCALE MECHANICAL PLAN**

Building: **STUDENTS' UNION BUILDING #54400**

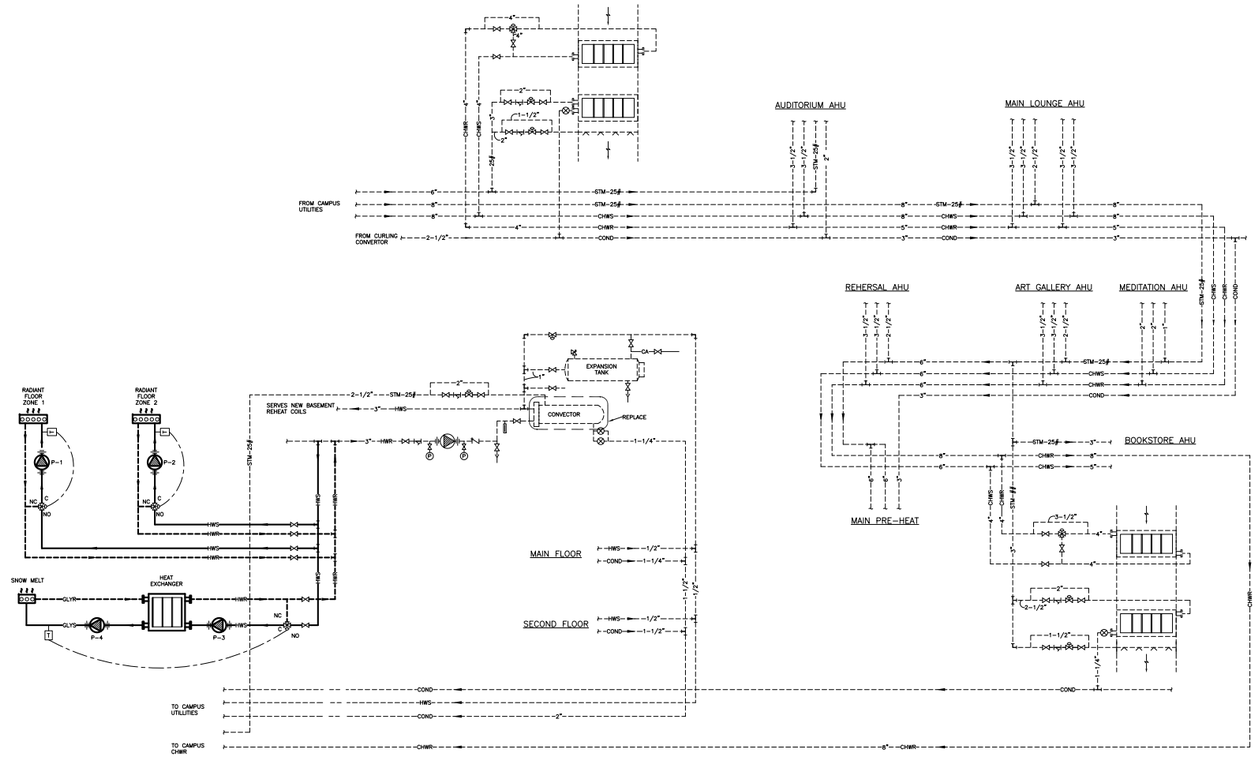
Job Number: XXX## | Work Order Number: #####

Arch ☐ Mech ☐ Elect ☐ Strct ☐ | Drawn By: DW

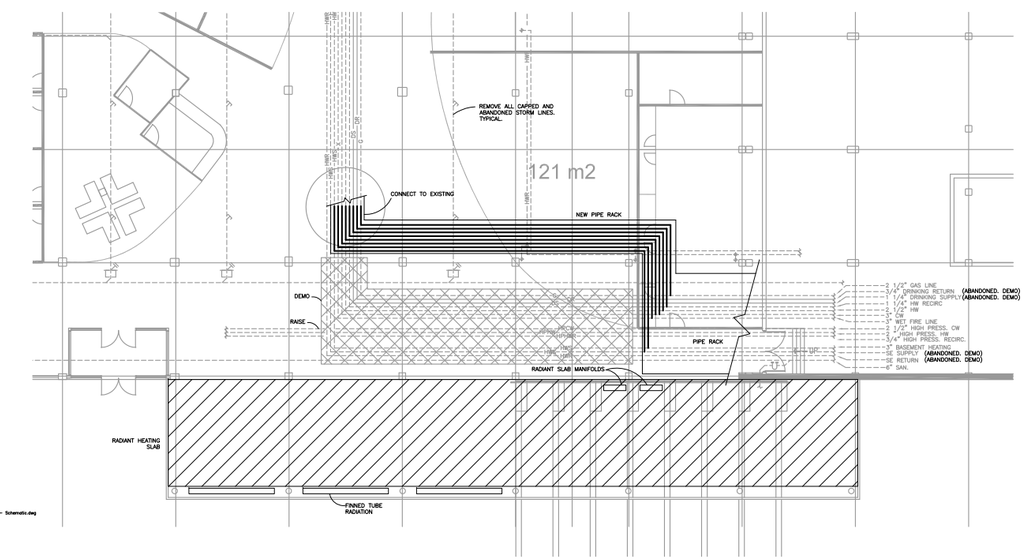
Plot Date: 15/02/2013 | Issue: A | Revision

Sheet | University Dwg Num

01257E02000 | **M1**



1 M2 MECHANICAL SCHEMATIC
SCALE: NTS
L:\Buildings\01257E\02\2 DESIGN\MECH\Draft Reports\DD\Report 2013-02-15\M2 - Schematic.dwg



2 M2 PIPING PLAN
SCALE: 1:100
L:\Buildings\01257E\02\2 DESIGN\MECH\Draft Reports\DD\Report 2013-02-15\M2 - Schematic.dwg

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG

Consultants Seal | Consultants Permit

Key Plan — NORTH

Issue			
Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision			
Letter	Date	By	Description

Faculty/Department: STUDENTS' UNION BUILDING

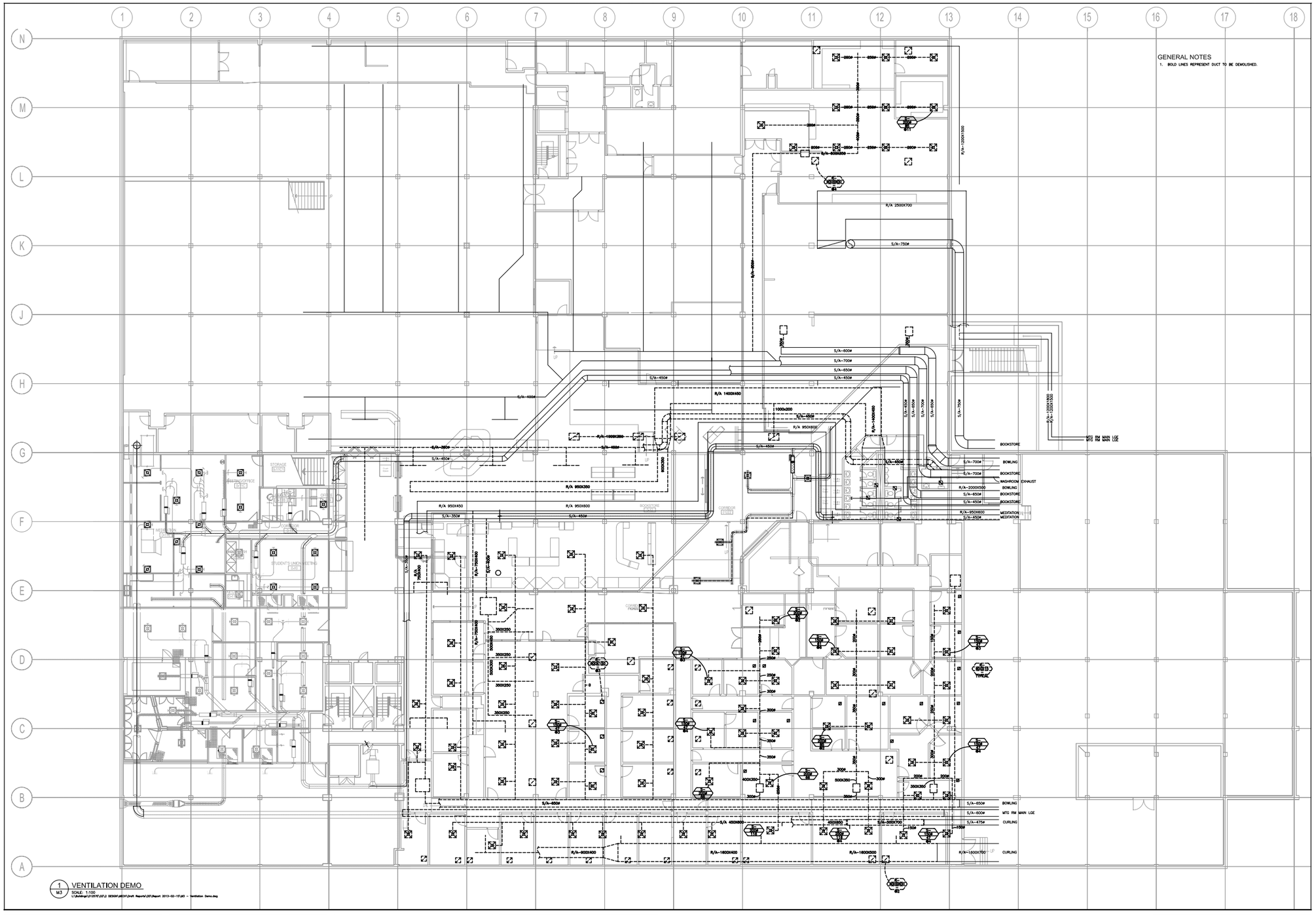
ADDITION AND RENOVATION

Client Approval Date

Dwg Title: **SCHEMATIC AND PIPING PLAN**

Building: **STUDENTS' UNION BUILDING #54400**

Job Number	XXX##	Work Order Number	#####
Arch ☐ Mech ☐ Elect ☐ Struct ☐		Drawn By	DW
Plot Date	15/02/2013	Issue	A
Revision			
Sheet		University Dwg Num	
01257E02000			M2



UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant

DIALOG™

Consultants Seal	Consultants Permit

Key Plan

NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: STUDENTS' UNION BUILDING

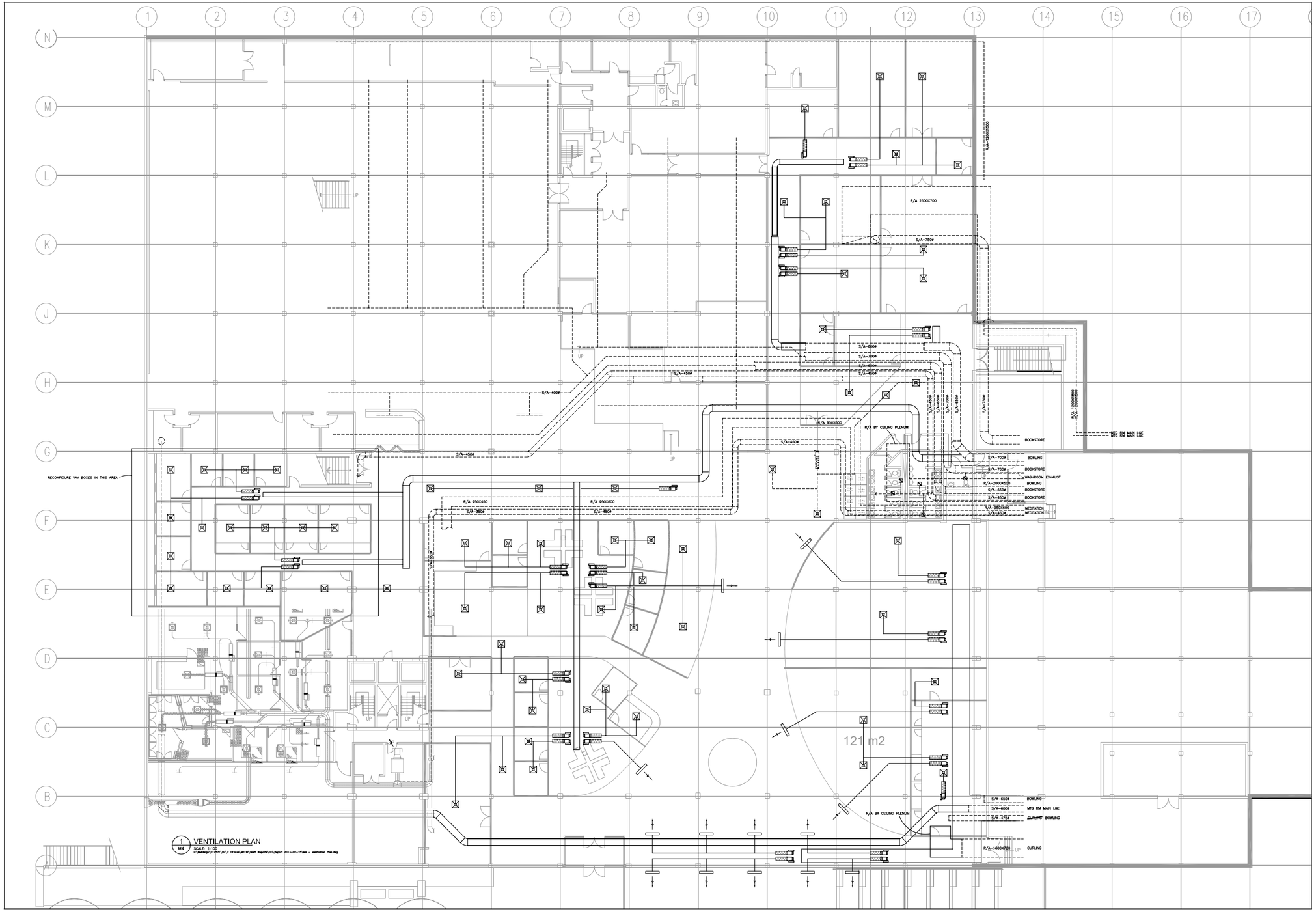
ADDITION AND RENOVATION

Client Approval Date

Dwg Title: **VENTILATION DEMO**

Building: **STUDENTS' UNION BUILDING #54400**

Job Number XXX##	Work Order Number #####
Arch ☐ Mech ☐ Elect ☐ Strct ☐	Drawn By DW
Plot Date 13/02/2013	Issue A / Revision
Sheet	University Dwg Num
01257E02000	M3



1 M4 VENTILATION PLAN
SCALE 1:100
L:\Buildings\01257E\02\3 DESIGN\MECH\Draft Reports\02\Report 2013-02-13\M4 - Ventilation Plan.dwg

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant

DIALOG™

Consultants Seal

Consultants Permit

Key Plan

NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

Client Approval Date

Dwg Title **VENTILATION PLAN**

Building **STUDENTS' UNION BUILDING #54400**

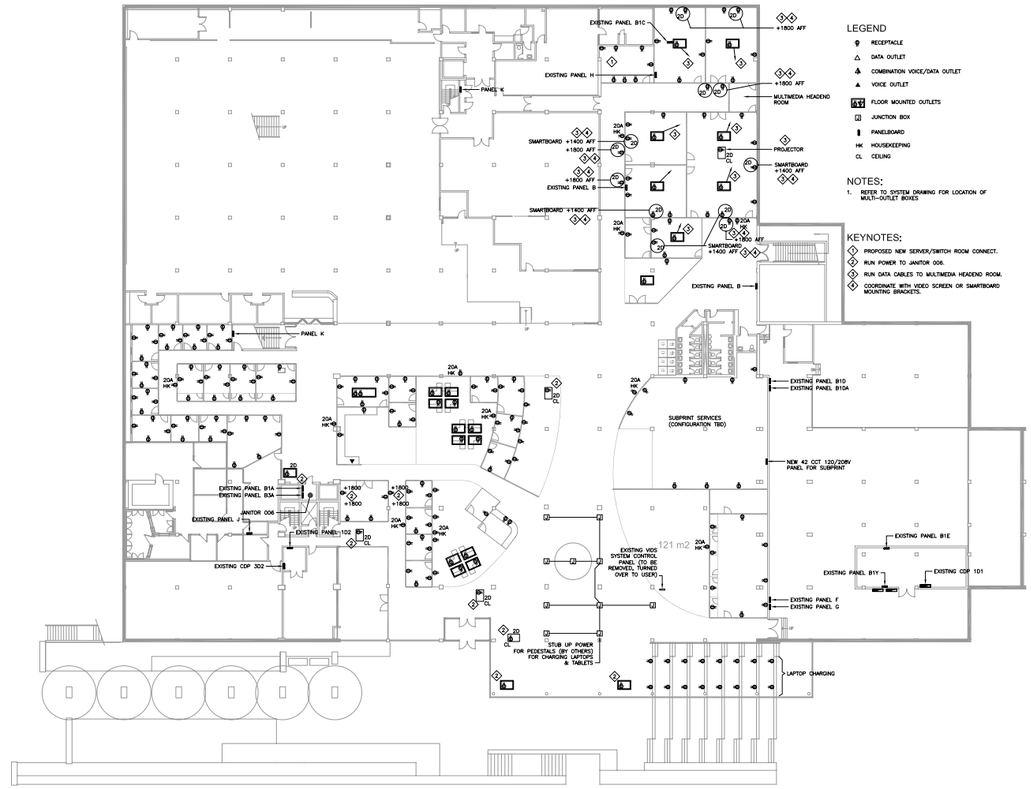
Job Number XXX## Work Order Number #####

Arch ☐ Mech ☐ Elect ☐ Strct ☐ Drawn By DW

Plot Date 13/02/2013 Issue A Revision

Sheet University Dwg Num

01257E02000 M4



LEGEND

- RECEPTACLE
- DATA OUTLET
- COMBINATION VOICE/DATA OUTLET
- VOICE OUTLET
- FLOOR MOUNTED OUTLETS
- JUNCTION BOX
- PANELBOARD
- HK HOUSEKEEPING
- CL CEILING

NOTES:

1. REFER TO SYSTEM DRAWING FOR LOCATION OF MULTI-OUTLET BOXES

KEYNOTES:

- PROPOSED NEW SERVER/SWITCH ROOM CONNECT.
- RUN POWER TO JANITOR 006.
- RUN DATA CABLES TO MULTIMEDIA HEADEND ROOM.
- COORDINATE WITH VIDEO SCREEN OR SMARTBOARD MOUNTING BRACKETS.

UNIVERSITY OF ALBERTA
PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG™

Consultants Seal | Consultants Permit

Key Plan — NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department: STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

Client Approval Date

Dwg Title: **LOWER LEVEL POWER PLAN**

Building: **STUDENTS' UNION BUILDING #54400**

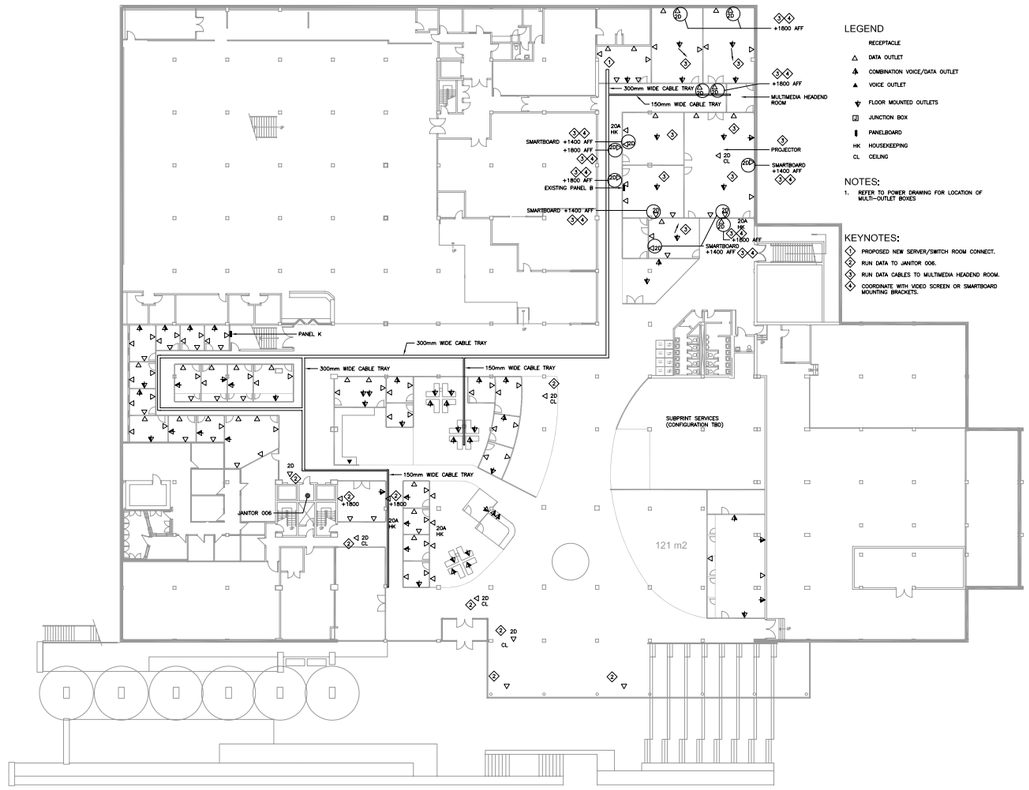
Job Number: – | Work Order Number: –

Arch ☐ Mech ☐ Elect ■ Struct ☐ | Drawn By: Author

Plot Date: – | Mk: **E** | Revision

Sheet | University Dwg Num

01257E02000 **E2.02**



LEGEND

- RECEPTACLE
- DATA OUTLET
- COMBINATION VOICE/DATA OUTLET
- VOICE OUTLET
- FLOOR MOUNTED OUTLETS
- JUNCTION BOX
- PANELBOARD
- HK HOUSEKEEPING
- CL CEILING

NOTES:

1. REFER TO POWER DRAWING FOR LOCATION OF MULTI-OUTLET BOXES

KEYNOTES:

1. PROPOSED NEW SERVER/SWITCH ROOM CONNECT.
2. RUN DATA TO JANITOR 006.
3. RUN DATA CABLES TO MULTIMEDIA HEADEND ROOM.
4. COORDINATE WITH VIDEO SCREEN OR SMARTBOARD MOUNTING BRACKETS.

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant: DIALOG™

Consultants Seal | Consultants Permit

Key Plan — NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

Client Approval Date

Dwg Title **LOWER LEVEL SYSTEMS PLAN**

Building **STUDENTS' UNION BUILDING #54400**

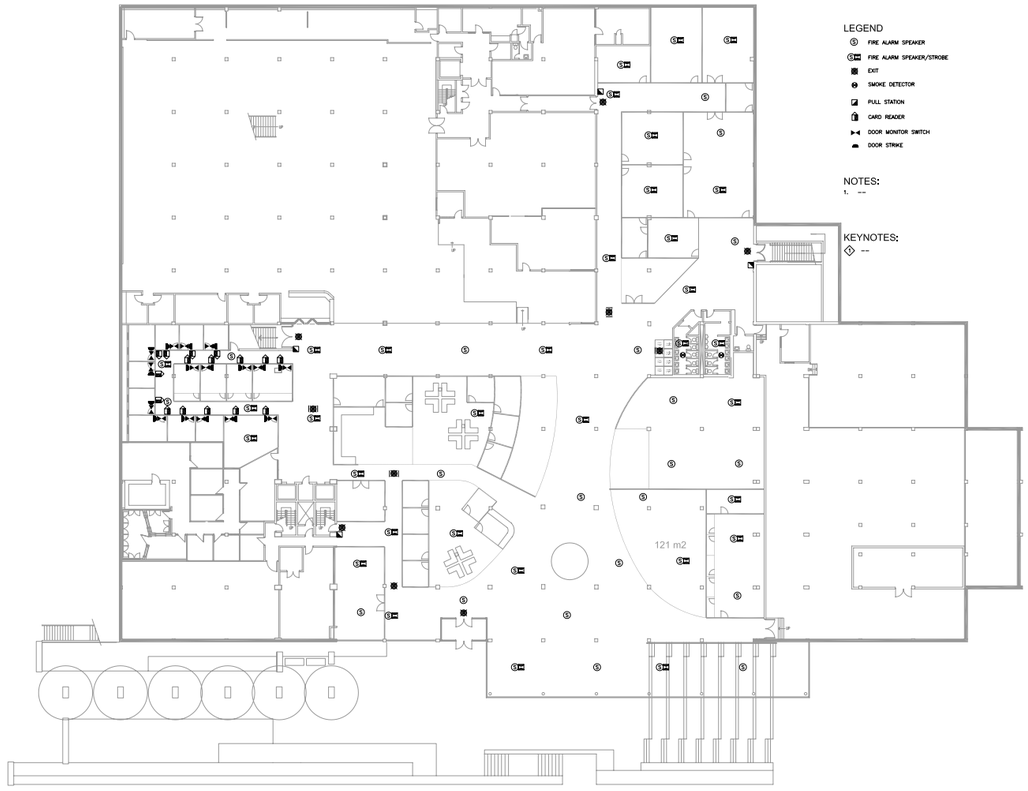
Job Number – | Work Order Number –

Arch ☐ Mech ☐ Elect ■ Strct ☐ | Drawn By **Author**

Plot Date – | ue **E** | Revision

Sheet | University Dwg Num

01257E02000 **E2.03**



LEGEND

- FIRE ALARM SPEAKER
- FIRE ALARM SPEAKER/STROBE
- EXIT
- SMOKE DETECTOR
- PULL STATION
- CARD READER
- DOOR MONITOR SWITCH
- DOOR STRIKE

NOTES:

1. --

KEYNOTES:

1. --

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant

DIALOG™

Consultants Seal

Consultants Permit

Key Plan

NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

Client Approval Date

Dwg Title **LOWER LEVEL PROPOSED FIRE PLAN AND MASS NOTIFICATION SECURITY**

Building **STUDENTS' UNION BUILDING #54400**

Job Number –

Work Order Number –

Arch ☐ Mech ☐ Elect ■ Strct ☐

Drawn By **Author**

Plot Date –

Lst **E**

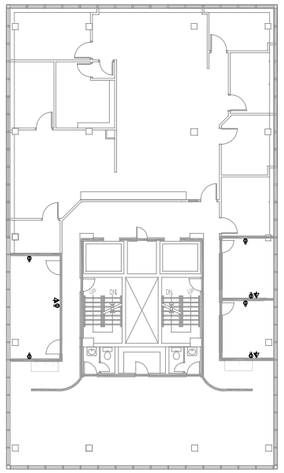
Revision

Sheet

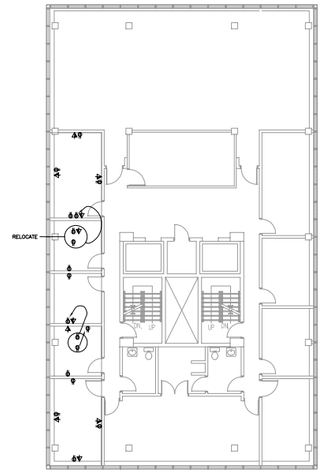
University Dwg Num

01257E02000

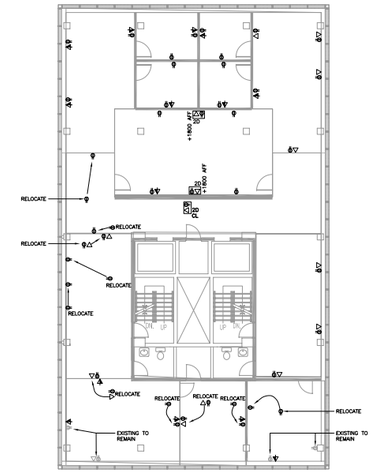
E2.04



1 E205 LEVEL 3
POWER & SYSTEMS PLAN
SCALE: NTS



2 E205 LEVEL 4
POWER & SYSTEMS PLAN
SCALE: NTS



3 E205 LEVEL 6
POWER & SYSTEMS PLAN
SCALE: NTS

UNIVERSITY OF ALBERTA

PLANNING AND INFRASTRUCTURE
TECHNICAL SERVICES
4-80 General Services Building, University of Alberta
Edmonton, Alberta T6G 2H1

Consultant

DIALOG™

Consultants Seal

Consultants Permit

Key Plan

NORTH

Issue

Letter	Date	By	Description
A			
B			
C			
D			
E			
F			
G			
H			

Revision

Letter	Date	By	Description

Faculty/Department STUDENTS' UNION BUILDING

ADDITION AND RENOVATION

Client Approval Date

Dwg Title **LEVEL 3,4 AND 6 POWER & SYSTEMS PLANS**

Building **STUDENTS' UNION BUILDING #54400**

Job Number –

Work Order Number –

Arch ☐ Mech ☐ Elect ■ Strct ☐

Drawn By **Author**

Plot Date –

ue **E**

Revision

Sheet

University Dwg Num

01257E02000

E2.05