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This Library Master Space Plan, complete with its executive summary, guiding principles, recommendations and implementation strategy, is the product of over eighteen months of extensive stakeholder engagement that included surveys, focus groups and open houses with students, faculty and staff. It is the product of our community and, as such, is in keeping with and pays tribute to the original architects of the University of Guelph and the McLaughlin Library, Macklin Hancock and Josep Lluis Sert.

Macklin Hancock, whose architecture firm Hancock, Little & Calvert successfully won the bid to design the campus Master Plan for the University of Guelph, graduated from the Ontario Agricultural College (OAC) before studying under Sert at the Harvard Graduate School of Design (HGSD). In addition to developing the University’s original Master Plan, which organized the campus like a small town surrounded and accessed through ring roads, Hancock was commissioned to design several buildings on campus including what is now the McLaughlin Library and the MacKinnon Building. In both the overall design of the campus and the layout of these two buildings, Hancock invited his old friend and mentor, Josep Sert, to collaborate on these projects.

Born in Barcelona in 1901, Sert famously designed the Pavilion of the Spanish Republic for the 1937 World’s Fair in Paris. At that time, Sert called upon contributions from his friends in the art world for the Exposition; Guernica was Pablo Picasso’s submission. Sert would go on to become the Dean of the Harvard Graduate School of Design, a post he would hold from 1953 to 1969. It was during this period that Sert’s architectural principles would influence the design and layout of the University of Guelph campus generally, and the McLaughlin Library more specifically.

Sert is probably best known as the father of urban design. As early as 1942, with the publication of his 250 page essay, Can Our Cities Survive?, Sert began to articulate his vision for the cities of the future. During that time period most architects’ notions of urban design centred around three adjectives: bigger, taller, faster. Not so for Sert. His philosophy was to always put the needs of the community first. Sert’s urban design program at HGSD, which still remains in place today, combined architecture, landscape architecture and planning into a harmonious and collaborative entity. Sert’s legacy is seen in urban design programs around the globe; it can also be seen in this very document.

The fact that the McLaughlin Library has managed to evolve and adapt to our ever-expanding student body, now servicing almost three times more students than it was designed to accommodate and twice the volumes, is a strong testament to the design skill of Hancock and Sert. While the changes and updates we are planning are much needed, we acknowledge our debt and gratitude to the Plan’s original authors.

In the spirit of a living document, we hope that this Plan will continue to inform and inspire those who follow and continue the legacy that began in 1968 with its original authors.
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EXECUTIVE SUMMARY

The McLaughlin Library at the University of Guelph is the heart of the academic community. The role of the Library and the nature of its services and collections have evolved to meet changing academic and research needs on campus. However, the physical Library spaces have not kept pace.

The Library Master Space Plan (LMSP) is a well-timed effort that provides a roadmap for a major McLaughlin Library renovation and building addition. The comprehensive plan will inform current decision making (1 to 5 years) through to intermediate and longer terms (10 to 15 years), allowing the Library to become a continued, vital and responsive resource.

In fall 2012, the University of Guelph Library began a master planning process involving key constituents of the University community. The planning process was guided by a highly dedicated LMSP-Working Group (LMSP-WG) and Advisory Group, which included Rebecca Graham, Chief Information Officer and Chief Librarian for the University of Guelph. Staff, students and faculty representatives were engaged during the effort.
A. KEY CONTRIBUTORS SHAPING THE MASTER PLAN

The role of Libraries has evolved substantially over the past decade:

- Increasing student engagement with the Library as a place for active learning, academic services and intellectual stimulation, e.g., Learning Commons and Academic Town Square programming.

- Evolving role in scholarly communication, from stewardship of and access to scholarly print and digital collections, to active collaborative roles in research and knowledge creation.

- Advancing academic technology and research computing requirements to support learning and research, and flexible core infrastructure demands such as power, wireless connectivity and network capacity.

The University of Guelph’s continual evolution:

- Aligning with the 2012 Campus Master Plan: McLaughlin Library was identified as a building worth investing in for the campus core.

- Fostering cross-disciplinary research and intellectual exchange, supporting active learning opportunities.

- Leveraging partnerships to enhance the facility and its offerings.

McLaughlin Library’s deficiencies today:

- Lack of study, collaboration and learning spaces. The 1968 Library was built for 9,000 students and now serves over 21,000.

- Insufficient electrical capacity and outlet access for today’s power-rich technologies.

- Inefficient space organization for staff, programs and amenities, that haven’t evolved with staff teams, user services or programming.

- Collection numbers far surpass original planning, i.e., 1.2 million current volumes versus the 625,000 planned.

- Existing campus study space is in high demand, with 93% of all study space on campus located in the McLaughlin Library.

- The current campus study space is well below Council of Ontario Universities (COU) norms, at only 46.5% of the goal.

- Lack of visibility and cohesiveness of the Library’s key areas and offerings.

- Entry point off of Winegard Walk is busy and difficult to negotiate at class change.

- Prime first floor space that would better serve as student and service space is dedicated to staff work areas.
B. GUIDING PRINCIPLES OF THE LMSP

The LMSP-Working Group (LMSP-WG) conducted a visioning exercise to define the space’s vision and goals (Figure 1.1). These statements are distinct from, yet align with and support, those articulated in the Library’s most recent strategic plan (Balance and Renewal: Library Integrated Plan 2012/13 - 2016/17). They serve as important guiding principles for renewal and revitalization of McLaughlin Library.

The Vision

The McLaughlin Library is the campus’ academic hub. Its inspirational spaces encourage student learning and engagement, and foster contemplation, exploration, discourse and collaboration.

The McLaughlin Library advances research, scholarship, information discovery and knowledge creation, and furthers student, faculty and researcher pursuits.

Goals

Guiding the plan are the following goals.

1. Provide inspirational spaces to foster great work and celebrate scholarship

   We will create a dynamic, engaging space that showcases campus teaching, learning and research, and how it relates to the world – fostering interdisciplinary and community engagement. The main level Academic Town Square continues to be an important venue for the celebration of scholarship.

   We will highlight connections among the Library’s programs, services and collections, to the University’s mission and the work of students, faculty and researchers through intentional design. The creation of a marquee front entrance, intuitive navigation, integrated digital and physical exhibits, interactive programming spaces, inspirational art placement, and an improved first floor experience will highlight the Library’s offerings to the campus community. Better adjacencies will ensure Library staff and expertise are integrated with services and collections, granting more accessibility to students and faculty, and aligning areas to foster collaboration and engagement.

2. Increase capacity and enhance student study and learning spaces

   The current seating capacity in McLaughlin Library is significantly limited. At peak times students have difficulty finding individual and group study spaces. Our goal is to increase seating capacity to 20% of the student population from the current baseline, which now accommodates up to 13% of the full time equivalent student base.

   Student study spaces will be designed to meet undergraduate and graduate students’ diverse learning styles. McLaughlin Library will have social and independent learning zones with noise-level indicators, as well as individual and group study spaces, a 24-hour study space and a graduate-level student commons.
3. Design teaching and learning spaces to improve the student experience

Library instructional and programming space is in high demand to support learning and broader campus needs. Classrooms and auxiliary spaces will be increased to provide greater room configuration flexibility to integrate and support teaching and active learning technologies. Innovative classrooms will enhance collaboration, improve knowledge transfer and engage multiple learning styles.

4. Leverage digital technologies and partnerships to enhance access to collections

The Library will continue to expand the electronic collection. Reducing the main collection’s footprint will free up space for student learning and studying. Our goal is to reduce the print collection from 1,230,000 volumes to 800,000 volumes – achievable through collection management projects such as de-duplication of low-use, older materials within the Tri-University Group (TUG) consortium, and the purchase of digital surrogates for print materials. Collections management policies and processes will ensure timely access to resources and maintain appropriate stewardship for our rich research collections.

We will expand Archival and Special Collections (A&SC) to accommodate unique and rare collections growth, providing optimal environmental conditions and supporting digitization. Through enhanced Reading Room and exhibit space capacities, we will increase our community’s engagement with the rich resources that A&SC offers.

5. Create flexible spaces and technological infrastructure

To meet evolving community needs and adapt to higher education advances, scholarly communication, research and technology, our facilities must be designed for flexibility and future developments.

Our goal is to harness technology to promote and advance learning, engagement, collections and research. We will enable knowledge creation and access to information (electronic resources, digital media, digital research visualization and data analysis) and support BYOD (bring your own device) with applications, technology, power, security and network infrastructure/capacity.

6. Foster and advance research

McLaughlin Library currently provides services and facilities supporting and advancing research – Branch Research Data Centre, Data Resource Centre, Research and Scholarly Communication Services. However, there is no physical alignment or visible coherence to this expertise, so campus awareness is diminished. We will create new space(s) that enable research and form a research community to foster collaboration and disciplinary exchanges.

Our goal is to create a research commons where faculty, researchers, and undergraduate and graduate students can collaborate on innovative research projects, create digital resources, analyze data and consult experts. The McLaughlin Library is an ideal location to support and advance cross-campus research collaborations and the student experience.

7. Upgrade mechanical and electrical systems

Mechanically a new variable air volume system will be introduced to improve the noisy, basically obsolete, energy-inefficient induction system. Power and electrical upgrades will be incorporated in all work to address programmatic needs and incorporate energy efficiency where possible. Daylighting and energy-efficient controls including building management systems will be enhanced through each phase.
### Library Master Space Plan Program Summary

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Space Use</th>
<th>Existing Total NASF</th>
<th>Proposed Total NASF</th>
<th>Difference</th>
<th>% Change</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Lobby &amp; Public Areas</td>
<td>5,099</td>
<td>7,705</td>
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<td>2</td>
<td>Study &amp; Collaboration Spaces</td>
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<td>3</td>
<td>Integrated Technology Meet/ Conference/Instruction</td>
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<td>4</td>
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<td>5</td>
<td>Public Services</td>
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<td>6</td>
<td>Research Collaboratory</td>
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<td>3,220</td>
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<td>7</td>
<td>Graduate Commons Areas</td>
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<td>11,260</td>
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<td>8</td>
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<td>43,677</td>
<td>-13,630</td>
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<td>9</td>
<td>Archives &amp; Special Collections</td>
<td>11,267</td>
<td>20,891</td>
<td>+9,624</td>
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<td>10</td>
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<th>Existing</th>
<th>Proposed</th>
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<td>Total Assignable Area (NASF)</td>
<td>163,816</td>
<td>208,737</td>
</tr>
<tr>
<td>Grossing Factor / Efficiency</td>
<td>62%</td>
<td>65%</td>
</tr>
<tr>
<td>Existing Building Gross Area</td>
<td>262,133</td>
<td>321,134</td>
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</table>

**FIGURE 1.1 Program Summary Table**

A full, detailed program is available in the Appendix (Section 5).

*while no additional staff space has been added, capacity has been provided through efficiency in planning.*
Given that this campus building is the only library, operationally a single transformation or complete shutdown is not achievable. A phased approach affords time to work within fiscal realities, and leverage partnership flexibility or opportunities.

Steps 1 to 3 focus on the existing building’s transformation, while Step 4 provides the needed expansion envisioned almost a half-century ago.

• Step 1: First steps to a transformed academic library (critical items in immediate need)
  a. Early steps will show discernible progress to the campus community, building interest in continued transformations and enhancing fundraising abilities for further projects.
     i. Create a first floor, 24-hour zone that includes a café.
     ii. Create a sixth floor graduate-focused level.
     iii. Remove second and third floor closed offices to expose exterior windows and expand user seating.
     iv. Install lower-level compact shelving units in open stack areas to consolidate books, and create user space on upper levels.
     v. Create a fourth floor outdoor roof patio for seasonal seating.

• Step 2: Transform main entry level and lower level
  a. In the intermediate term, projects will transform the main floor experience and the campus pedestrian approach and embark on an A&SC expansion. These sub steps include:
     i. Decanting first floor staff from existing areas.
     ii. Constructing a learning commons, staff areas and meeting rooms in the vacated first floor.
     iii. Constructing a new, main entrance on the north façade to Winegard Walk.
     iv. Completing the remaining interior main floor renovation.
     v. Expanding and reconfiguring the lower-level archive storage areas and workspaces.
     vi. Constructing the second floor public A&SC programs, including an exhibit room, reading room, multi-purpose spaces, conservation and digitization labs.

• Step 3: Transforming Levels 2 - 5
  a. Subsequent work will address remaining floors for interior renovation, and supplement collection capacity with limited compact shelving. Each renovation level will add new seating capacities.
     i. Completing the remaining second floor renovation will complement earlier archives expansion, with new research collaboration space, media technology labs and meeting space.
     ii. While the third floor science commons remains intact, the Library’s administration suite will be reconfigured to consolidate staff and enlarge the Florence Partridge Room.
     iii. Remaining fourth and fifth floor renovations complete the existing Library building adjustments.

• Step 4: Construct a critically needed addition for the future
  a. While Steps 1 to 3 focused on the 1968 building renewal, adequate space is still unavailable to fully meet requirements, and therefore an addition is needed. A building addition will insert much-needed seating, collection rooms and instructional space capacities.
  b. The addition was initially conceived as a longer-term goal, undertaken independently after Steps 1 to 3. Moving this phase as far forward as fiscal constraints allow is the recommendation. The sooner this addition can be constructed, the sooner the issues with study space capacities and program space can be addressed as well as having renovation swing space to minimize disruption.
**D. RECOMMENDED ACTIONS**

The McLaughlin Library is a key partner supporting continued growth and improvements on the University of Guelph campus. Moving beyond the LMSP to actual implementation will achieve transformational goals that touch virtually every aspect of the academic community. It is recommended the path forward must consider the following:

- Undertaking project steps that provide immediate/visible reinforcement to inspire further commitment of funds.
- Align deferred maintenance projects with Library Master Space Plan initiatives, to the extent possible by collaboration with Physical Resources.
- Build cross-community support to attract funds beyond the campus.
- Prioritize and align all projects with plan principles.

When undertaken, these steps will ensure the McLaughlin Library serves the campus community and future generations in the best way possible.

**FIGURE 1.2 Project Phasing Diagram**
## FIGURE 1.3 Costs Summary

<table>
<thead>
<tr>
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<tbody>
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<td></td>
<td>1.1 - 1.5</td>
<td>2.1 - 2.4</td>
<td>3.1 - 3.4</td>
<td>4</td>
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<tr>
<td>Cost Type</td>
<td>Project Cost</td>
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<tr>
<td>Existing Renovation *</td>
<td>$2,715,400</td>
<td>$24,843,980</td>
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<td>$42,062,920</td>
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<td>Site Improvements</td>
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<td>$875,000</td>
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<td>New Construction</td>
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<td></td>
<td></td>
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<td>$24,298,000</td>
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<td>Compact Shelving</td>
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<td>$1,186,000</td>
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<td>Furniture &amp; Technology</td>
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<td>$3,168,460</td>
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<td>$7,464,080</td>
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<tr>
<td>Total</td>
<td>$5,334,500</td>
<td>$26,673,500</td>
<td>$18,858,000</td>
<td>$27,473,000</td>
<td>$78,339,000</td>
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</tbody>
</table>

* excludes deferred maintenance costs unless triggered by projects
02. PROGRAM ASSESSMENT

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A. METHODOLOGY

The year-long study started with data collection and evaluation of existing conditions. The program development for the McLaughlin Library began with an existing space analysis, utilizing COU-coded data, in conjunction with a facility issues and usage pattern investigation. The existing program was initially organized by department units, and restructured to track COU codes and reflect the emerging programmatic vision. The Library’s space inventory was then compared against other COU-institution inventories. Analysed space data was also compared against other Canadian and U.S. academic research libraries and other similar libraries to provide a realistic measuring stick as to other institutions’ offerings. The Library’s tri-annual public furniture inventory was also analyzed against historical and current enrollment from the University’s 2011/2012 Annual Statistical Report.

The Library’s Information Resources unit provided forward-looking collection management scenarios, and status reports of off-site storage facilities maintained with TUG consortium partners.

An emphasis on consulting with various stakeholder groups of the campus community regarding wants, needs and deficiencies they see with the existing Library facility was also integral to the process.

B. BENCHMARKING RESEARCH

The desire to understand a larger context beyond a single university prompted an initial benchmarking project. Through CannonDesign, the LMSP-WG team initiated research from the Education Advisory Board (EAB), which provides best-practice research and advice to leaders of academic affairs, business affairs, student affairs, and continuing online and professional education across North America. CannonDesign and the LMSP-WG developed questions related to space, collections, campus connectivity, the Library’s evolving role and campus support for the EAB to investigate. Based on the project challenge, the EAB interviewed library directors and vice provosts at large, public U.S. and Canadian universities classified as research, comprehensive or medical doctoral institutions. EAB generated a custom research brief profiling eight peer institutions from which key observations can be drawn:

- Public space accounts for the majority of allocated space in the profiled institutions, a clear trend among academic libraries. At one extreme, Oregon State University allocates only 14% to its collection and more than 72% to public/study space. Figure 2.1a, 2.1b and 2.1c on the opposing page summarize key findings for overall space allocation compared against the University of Guelph’s existing spatial profile, and highlight two Canadian institutions’ library programs.

- Reserve-able rooms must accommodate various group sizes and activities, with enhanced technology to support increasing instruction taking place in the library.

- Emerging technologies have prompted libraries to make physical changes to buildings. As future technology and standards are not predictable, decision variables must consider incorporation of flexibility to space configuration and technology infrastructure. Furniture with power supply integration, demountable partitions and wireless connectivity are current examples.

- Academic support integrating learning commons. The McLaughlin Library has already incorporated some of the services noted at profiled peer institutions: a writing center, accessibility services, information technology support and peer-tutor support. One notable absence, which appears in two contact institutions, is a graduate reading room space.

- Alignment of library planning with institutional goals. The importance of feedback and involvement of the user community in planning library changes through interviews, surveys and participatory activities was emphasized by all peers.

- Evaluation of library success through user satisfaction and usage statistics. While librarians may prefer qualitative metrics as commonly measured in user satisfaction surveys, university senior leadership prefers quantitative metrics.
FIGURE 2.1a Benchmarking Peer Institution Space Allocation

STACK & ADMINISTRATION
FL4, FL5 & FL6

STUDENT SUCCESS CENTER FL3

COLLABORATIVE STUDENT SPACE
FL1 & FL2

EXISTING MAIN LIBRARY
10 FLOORS
251,995 SF

NEW STUDENT LEARNING CENTRE
COLLABORATIVE STUDENT SPACE
+8 FLOOR ADJACENT BUILDING WITH RETAIL
$112 MILLION
+155,000 SF

FIGURE 2.1b University of Calgary’s Taylor Family Digital Library Vertical Organization

FIGURE 2.1c Ryerson University Building Extension
C. ENGAGEMENT PROCESS

The Library’s success depends on high levels of stakeholder involvement, community education and constituent collaboration during the planning phase. The master space planning process included activities to engage stakeholder groups and campus community representatives, ensuring proposed changes reflected the needs and aspirations of all who use, work and encounter the Library. A series of facilitated communication methods were created to gather meaningful input and initiate inspiration for the planning team and participants.

• Town Hall Events

In late January 2013, town hall events were conducted to engage students. Planning team members were joined by the University of Guelph representatives: Rebecca Graham, CIO/Chief Librarian; Kelly Bertrand, Director, Organizational Services; and Jill Vigors, Physical Resources – Design, Engineering and Construction. The University Centre was selected because of its bustling activity. The next day, Library staff and students gathered in the Academic Town Square for the same exercise within the Library environment. The exercises generated valuable information on student-and-staff interactions, creating discussions about aspirations for the building. The student outcomes illustrated their top priority as “More Study Spaces - Consolidate the Books.” Lack of study space was a clearly identified challenge for future planning discussions.

The student engagements helped spread awareness about the planning project, gained public support for the process, and presented the LMSP-WG with direct feedback from constituents (Figure 2.2).

• Focus Group Discussions

The focus group format encouraged open discussion with ice-breaker questions such as:
  • Why study in the Library?
  • Where is your favourite place on campus?

Sessions in January and February 2013 posed questions to staff, faculty and students about their thoughts and aspirations for McLaughlin Library. The following focus group discussions were held:
  • Staff groups 1 and 2: Describe a “Day in the Life” at the Library.
  • Students with faculty groups 1 and 2: Library Positives - Negatives.
  • Residence group: A session with undergraduate students in their residence hall gathered impressions taken outside of classes and the typical academic setting.
  • Graduate student group: Discussions related to graduate student use of the Library yielded ideas applicable to the wider user community.
  • Research-themed group: Participants, including faculty from the College of Arts, discussed their commitment to research.
  • Faculty group: Participants with vested Library interests.
  • Advisory group: Members represented all groups – faculty, graduate students, undergraduate students and library staff.

• Digital Outreach

Survey tools for generating Library interest and feedback included announcements on the Library’s website, an e-mail address to receive feedback (lmsp@uoguelph.ca), placements in general campus publications, and digital outreach to collect input from staff directly. Using an online survey tool, FluidSurveys, Library staff answered questions related to their workspace.

After gathering survey responses, the LMSP-WG better understood their constituents and adjusted the master space plan approach to reflect priorities:
  • Placement of staff space will reinforce existing partnerships and community access.
• Clarity in organization with all program elements.
• Identify the amount of browseable collections in the building.
• Address the appropriate treatment of noise concerns.

• Interactive Planning Workshop
CannonDesign led a hands-on activity in McLaughlin Library during the summer. In partnership with Library staff, the workshop’s goal was to formulate the first floor experience. The session energized the entire planning team and process by introducing new perspectives on service models, user experience and circulation patterns for arguably the most critical space – one that will establish a first and lasting impression of the Library and its services.

Six participant groups (four to a table) were asked the following lead-off questions:
• What are student impressions of the first floor today?
• What would you say at the end of the semester?
• How would graduates respond? Faculty?
• What are three things you would change about the first floor?

Using the kit-of-parts tool kit, the planning team envisioned a new main level transformation, with key improvements to better serve the current and future academic community.

• November Town Hall
In November 2013, a follow-up town hall meeting shared the initial findings of the year-long process and recommended directions for the Library Master Space Plan (Figure 2.3). A campus-wide invitation was extended to communicate prior suggestions to the University community, while creating an additional opportunity for feedback to the planning team as they developed final recommendations.

ABSOLUTELY LOVE IT!
I AM REALLY LOOKING FORWARD TO SEEING ALL THESE CHANGES AND WILL BE A PROUD GRYPHON IF EVERYTHING GOES ACCORDING TO PLAN.

EVERY EFFORT TO MAKE THE LIBRARY A MORE COMFORTABLE AND EFFICIENT PLACE IS APPRECIATED!

EACH ISSUE (SEATS, PLUGS, ETC.) IS TAKING INTO CONSIDERATION WITH ITS IMPORTANCE RECOGNIZED. IT IS CLEAR THAT THE RIGHT PROBLEMS AND CONCERNS ARE BEING DEALT WITH.

FIGURE 2.2 Town Hall 2, Notable Comments
MORE PLUGS
24 HOUR ZONE
MORE STUDY SPACE
GRAD FLOOR
NEW FRONT DOOR
NATURAL LIGHTING
LOCKERS FOR COMMUTERS
AN ADDITIONAL CAFE
SECOND LIBRARY
SOUND PROOF ROOMS
MORE PUBLIC COMPUTERS
PLANTS AROUND THE LIBRARY
ALL TABLES ACCESS TO OUTLETS
MORE PRIVATE GROUP STUDY ROOMS
ASK US/HUB TOO FAR FROM NEW ENTRANCE
LIMITED RESEARCH CAPABILITIES
TAKING AWAY THE BOOK STACKS
LARGER NOISE VOLUME WITH LARGER CAPACITY
WANT TO SEE A TIMELINE OF WHEN CHANGES WILL OCCUR

FIGURE 2.3 Town Hall 2, Comment Likes/Requests/Concerns
D. KEY FINDINGS

Initial findings confirmed readily observable conditions and reinforced their significance with quantifiable metrics to inform and direct program development – supporting the assertion that the McLaughlin Library has achieved successes but an increased physical space will realize long-term vision and goals, while supporting the University’s broader mission.

- With 2,713 current seats, the Library can accommodate 13% of the University’s FTE (full-time equivalent) student population. This represents a 43% increase over 2006, a prior 20% enrollment growth period, but compares with commuter campuses and is low for residential campuses like University of Guelph.

- Comparisons against peer Ontario institutions (Figure 2.4) and COU space standard reveals the University meets 76% of the Library space targets and 46.5% of campus study space targets.

- With 93% of campus study space found in the Library (Figure 2.5), less space can be dedicated for programming. This highly consolidated study space into one campus building is unusual and not typical of other Ontario academic institutions. While more study space is needed throughout the Guelph campus, this consolidation reinforces the importance of the Library to provide academic learning, program and study space outside the classrooms.

- While 890 electrical outlets have been added since 2005, the continued deficit is revealed as users routinely seek power where seating does not exist or is not planned. As more and more students bring mobile devices onto the campus, the Library must pursue new charging options.

- The COU space inventory indicates the Library maintains 20% more collection than study space.
E. Projected Needs

Through this methodology two streams of demand on space became evident. The first was a rudimentary space demand for increased student space, given that the Library was not built for the student population of today with the issue of housing 93% of University of Guelph study space. The second was that of meeting the programming and offerings that a library must fulfill on the campus of today and enabling future responsiveness. This second demand is built on heavy user and stakeholder input compared against benchmarking data with the added layer of a tight fiscally responsible planning philosophy.

i. Space Deficit Needs

It was evident very early in the planning process that McLaughlin Library isn’t large enough for current conditions. Specifics were quantified by analyzing the Library’s primary space drivers, user space, collection space and staff/administration space, and three corresponding parameters for the project were established.

o Student seats/lack of study space

How many seats should be available was a primary question of this study. As a FTE student ratio, assuming flat growth, University enrollment should target additional seating (Figure 2.6). Applying a 20% user seats target for a residential campus like University of Guelph, the Library needs 1,607 additional seats for a projection of 4,320 seats. Using library planning metrics of 25 to 30 sf per seat, this equates to a need for an additional 40,000 – 48,000 net assignable square feet (nasf) of space for seating.
How many stored books are essential? The Library’s collection management team considered the current Tri-University Group’s (TUG) Print Monograph Management Project (PMMP) for the shared, off-site storage facility. As benchmarking research shows, academic library trends dedicate greater public and study space allocation, while decreasing spaces housing collection materials. The most implementable, long-term target was selected (Figure 2.7) and modified to estimate capacity during an interim time frame to reduce the on-site collection from 1.2 million volumes to approximately 800,000 volumes (see Section 5).

<table>
<thead>
<tr>
<th>Item Type</th>
<th>Current Volumes</th>
<th>Reduction</th>
<th>Reduction Target</th>
<th>Proposed Retain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodicals</td>
<td>128,186</td>
<td>50%</td>
<td>64,093</td>
<td>64,093</td>
</tr>
<tr>
<td>Books</td>
<td>816,545</td>
<td>20%</td>
<td>163,309</td>
<td>653,236</td>
</tr>
<tr>
<td>Govt Docs</td>
<td>275,917</td>
<td>67%</td>
<td>184,864</td>
<td>91,053</td>
</tr>
<tr>
<td>Total</td>
<td><strong>1,220,648</strong></td>
<td><strong>34%</strong></td>
<td><strong>412,266</strong></td>
<td><strong>808,382</strong></td>
</tr>
</tbody>
</table>

FIGURE 2.8 Long Term Collection Targets

Staff/administration support spaces

Allocated staff space was analysed and deemed only marginally in need of increase. This was accomplished through bringing workstations in line with University of Guelph standard office space allocations, reorganizing by teams with adjacency and maximum circulation efficiencies.
ii. Program Needs

Beyond the three areas of basic library programming there are many spaces required to support programs essential to the University of Guelph’s academic mission. From CannonDesign’s research and the feedback from the in depth engagement process with the University of Guelph at large, the LMSP-WG developed these goals:

1. Provide inspirational spaces to foster great work and celebrate scholarship

We will create a dynamic, engaging space that showcases campus teaching, learning and research, and how it relates to the world – fostering interdisciplinary and community engagement. The main level Academic Town Square continues to be an important component and space to celebrate scholarship.

We will highlight connections among the Library’s programs, services and collections, to the University’s mission and the work of students, faculty and researchers through intentional design. The creation of a marquee front entrance, intuitive navigation, integrated digital and physical exhibits, interactive programming spaces, inspirational art placement, and an improved first floor experience will highlight the Library’s offerings to the campus community. Better adjacencies will ensure Library staff and expertise are integrated with services and collections, granting more accessibility to students and faculty, and aligning areas to foster collaboration and engagement.

2. Increase capacity and enhance student study and learning spaces

The current seating capacity in McLaughlin Library is significantly limited. At peak times students have difficulty finding individual and group study spaces. Our goal is to increase seating capacity to 20% of the student population from the current baseline, which now accommodates up to 13% of the full time equivalent student base.

Student study spaces will be designed to meet undergraduate and graduate students’ diverse learning styles. McLaughlin Library will have social and independent learning zones with noise-level indicators, as well as individual and group study spaces, a 24-hour study space and a graduate-level student commons.

3. Design teaching and learning spaces to improve the student experience

Library instructional and programming space is in high-demand to support learning and broader campus needs. Classrooms and auxiliary spaces will be increased to provide greater room configuration flexibility, and to integrate and support teaching and active learning technologies. Innovative classrooms will enhance collaboration, improve knowledge transfer and engage multiple learning styles.

4. Leverage digital technologies and partnerships to enhance access to collections

The Library will continue to expand the electronic collection. Reducing the main collections footprint will free up space for student learning and studying. Our goal is to reduce the print collection from 1,230,000 volumes to 800,000 volumes – achievable through collection management projects such as de-duplication of low-use, older materials within the Tri-University Group (TUG) consortium, and the purchase of digital surrogates for print materials. Collections management policies and processes will ensure timely access to resources and maintain appropriate stewardship for our rich research collections.

We will expand Archival and Special Collections (A&SC) to accommodate unique and rare collections growth, providing optimal environmental conditions and supporting digitization. Through enhanced Reading Room and exhibit space capacities, we will increase our community’s engagement with the rich resources that A&SC offers.
5. Create flexible spaces and technological infrastructure

To meet evolving community needs and adapt to higher education advances, scholarly communication, research and technology, our facilities must be designed for flexibility and future developments.

Our goal is to harness technology to promote and advance learning, engagement, collections and research. We will enable knowledge creation and access to information (electronic resources, digital media, digital research visualization and data analysis) and support BYOD (bring your own device) with applications, technology, power, security and network infrastructure/capacity.

6. Foster and advance research

McLaughlin Library currently provides services and facilities supporting and advancing research – Branch Research Data Centre, Data Resource Centre, Research and Scholarly Communication Services. However, there is no physical alignment or visible coherence to this expertise so campus awareness is diminished. We will create new space(s) that enable research and form a research community to foster collaboration and disciplinary exchanges.

Our goal is to create a research commons where faculty, researchers, undergraduate and graduate students can collaborate on innovative research projects, explore and create digital resources and tools, manage and analyze data and consult experts. The McLaughlin Library is an ideal location to support and advance cross-campus research collaborations and integrate research into the student experience.

7. Upgrade mechanical and electrical systems

Mechanically a new variable air volume system will be introduced to improve the noisy, basically obsolete, energy-inefficient induction system. Power and electrical upgrades will be incorporated in all work to address programmatic needs and incorporate energy efficiency where possible. Daylighting and energy-efficient controls including building management systems will be enhanced through each phase.

F. PLANNING PRIORITIES

Once the projected needs assessment concerning the above criteria was complete, a detailed space allocation phase was initiated. Main strategies emerged to satisfy the needs and goals identified. Over time, the McLaughlin Library will:

- Make more efficient use of space; reclaim corridors/storage and collection square footage,
- Add more student seats and bookable flexible meeting rooms,
- Continue to enhance user services and ease of access
- Improve accessibility to commonly used library services
- Enhance campus connections and partnerships
- Reduce print collections
- Increase innovative program spaces
- Create adjacencies with best synergy and noise level considerations
- Improve staff amenities, workspace and organization
- Upgrade services and the building’s environment
## 03. LIBRARY MASTER SPACE PLAN

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<td>D. SOLVING THE SPACE DEFICIT</td>
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<td>E. PROGRAMMING AND GOALS SOLUTIONS</td>
<td>34</td>
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</table>
## Library Master Space Plan Program Summary

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Space Use</th>
<th>Existing Total NASF</th>
<th>Proposed Total NASF</th>
<th>Difference</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lobby &amp; Public Areas</td>
<td>5,099</td>
<td>7,705</td>
<td>+2,606</td>
<td>51%</td>
</tr>
<tr>
<td>2</td>
<td>Study &amp; Collaboration Spaces</td>
<td>34,810</td>
<td>64,771</td>
<td>+29,961</td>
<td>86%</td>
</tr>
<tr>
<td>3</td>
<td>Integrated Technology Meet/Conference/Instruction</td>
<td>6,738</td>
<td>22,648</td>
<td>+15,910</td>
<td>236%</td>
</tr>
<tr>
<td>4</td>
<td>Collaborative Services</td>
<td>18,219</td>
<td>16,455</td>
<td>-1,763</td>
<td>-10%</td>
</tr>
<tr>
<td>5</td>
<td>Public Services</td>
<td>10,800</td>
<td>10,690</td>
<td>-110</td>
<td>-1%</td>
</tr>
<tr>
<td>6</td>
<td>Research Collaboratory</td>
<td>844</td>
<td>3,220</td>
<td>+2,376</td>
<td>281%</td>
</tr>
<tr>
<td>7</td>
<td>Graduate Commons Areas</td>
<td>10,124</td>
<td>11,260</td>
<td>+1,136</td>
<td>11%</td>
</tr>
<tr>
<td>8</td>
<td>General Collection &amp; Media</td>
<td>57,307</td>
<td>43,677</td>
<td>-13,630</td>
<td>-24%</td>
</tr>
<tr>
<td>9</td>
<td>Archives &amp; Special Collections</td>
<td>11,267</td>
<td>20,891</td>
<td>+9,624</td>
<td>85%</td>
</tr>
<tr>
<td>10</td>
<td>Library Administration &amp; Support</td>
<td>2,179</td>
<td>2,180</td>
<td>+1</td>
<td>0% *</td>
</tr>
<tr>
<td>11</td>
<td>Staff Support</td>
<td>1,711</td>
<td>1,711</td>
<td>+0</td>
<td>0%</td>
</tr>
<tr>
<td>12</td>
<td>Facilities Services</td>
<td>3,229</td>
<td>3,229</td>
<td>+0</td>
<td>0%</td>
</tr>
<tr>
<td>13</td>
<td>Building Storage</td>
<td>1,489</td>
<td>300</td>
<td>-1,189</td>
<td>-80%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Existing</th>
<th>Proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Assignable Area (NASF)</td>
<td>163,816</td>
<td>208,737</td>
</tr>
<tr>
<td>Grossing Factor / Efficiency</td>
<td>62%</td>
<td>65%</td>
</tr>
<tr>
<td>Existing Building Gross Area</td>
<td>262,133</td>
<td>321,134</td>
</tr>
</tbody>
</table>

FIGURE 3.1 Program Summary Table

A full, detailed program is available in the Appendix (Section 5).

*while no additional staff space has been added, capacity has been provided through efficiency in planning.*
Preliminary strategies developed concurrently during the programming stage helped clarify the magnitude of additional space needed to achieve program requirements (Figure 3.1), and established planning priorities. Additional schemes were evaluated and compared. Consultation with the Physical Resources division further informed site options, existing utilities and limitations to guide decisions. Several options and alternatives were explored, and ultimately a preferred multi-phase solution became the focus.

**A. PRELIMINARY CONCEPTS**

Three preliminary strategies proposed tactics to accommodate collection space targets and user seating:

1. Regular shelving: Regular shelving for an 800,000-volume collection could remain in the existing building. To add 1,600 seats (25% each of table/carrel/lounge/computer seating) requires 53,000 nasf. At 67% building efficiency to account for building services, circulation and non-assignable space, the result is an 80,000 gsf building.

2. Compact shelving. To retain seating and library service programs in the existing building, the 800,000 volumes will be moved to compact shelving in a 42,400 gsf addition (28,260 nasf at 67% building efficiency), which also recaptures +12,000 sf of floor space in the existing space.

3. Automated Storage & Retrieval System (ASRS). To retain seating and library service programs in the existing building, the collection will be transferred to an ASRS which is optimally effective with a one million volume capacity, requiring 12,000 gsf (8,600 nasf at 72% building efficiency).

These strategies were employed when testing concept alternatives for the building.

**B. ALTERNATIVES EXPLORED**

1. Alternative #1 explored renovating the existing facility with no addition. The investigation explored a plan to fill the lower level with compact shelving (53% of the collection) and distribute the remainder in standard stacks on upper floors. This concept meets the collection space goal, but only achieves 70% of the study space goal. It features expansion of A&SC in lower level by separating exhibition/public functions to the second floor, and creates new study space on the third, fourth and fifth floors.

2. Alternative #2 explored renovation with no addition. This concept meets the study space goal, but only achieves 39% of the collection space and requires either off-site storage or greater reduction in the collection volumes. To accommodate expanded A&SC on a lower level leaves limited availability for compact shelving where structural load is not an issue.

3. Alternative #3 explored renovation and addition (+26,600 gsf). The investigation explored a plan to build an ASRS in a rooftop reading room, termed a “winter garden.” This option meets the collection space goal and exceeds the study space goal, but it would be difficult to alter the use of this purpose-built facility, and it would require a substantial equipment investment (sized for three book robots at $800,000 to $1 million each). This option completely alters the Library’s service operations, but adds a new entry and lobby off Winegard Walk.

4. Alternative #4 explored a renovation and addition (+42,800 gsf). The investigation explored a plan to build a compact shelving addition and a winter garden reading area. It meets the collection space goal (with 66% in compact shelving), and is within 8% of the seating target. In place of the ASRS, four levels of compact shelving with a new entry and lobby off Winegard Walk are added.
C. PREFERRED ALTERNATIVE

5. Alternative #5, the preferred scenario, explored a renovation (Figure 3.2) and +58,000 gsf addition (Figure 3.3). The investigation explored a plan to build an addition for active learning and compact shelving, as well as a winter garden reading area. This alternative meets the study space goal, and falls only 9% below the collection space goal (55% in compact shelving). In place of the ASRS, two levels of active learning instruction space, two levels of compact shelving, and a new entry and lobby off Winegard Walk are included.

D. SOLVING THE SPACE DEFICIT

• Collections
Providing the appropriate amount of physical print collection space: Serving tomorrow’s students.

The reduction of collections through a number of methods is the key to providing much-needed space for student study areas. The Library currently dedicates 20% more floor space to collections than it does to seating or study spaces. While some collections will be reduced and moved off-site, there is still a need for on-site print collections. To meet requirements for print materials to remain in the Library, compact shelving strategies have been introduced. Compact shelving will recapture floor area for public study and seating, while integrating more technology and expanding access. The 1.2 million volume collection will be reduced to 800,000 browseable volumes that occupy 36% less floor space with highly space-efficient, compact shelving units.

The Information Resources Unit’s ongoing work provides collection management models for the LMSP to test and consider. The University of Guelph is currently working with its TUG consortium partners to evaluate collection capacities of the TUG system and the off-site storage facility, identifying likely candidates for withdrawal or substitution. These parallel efforts enable the LMSP to make informed assumptions and projections in the context of the remaining building program.

• Collection Distribution
Collection space is found in standard book stacks except the first and sixth floors. A&SC is in the basement (also housing maps, government documents and openly accessed compact shelving). The proposed plan features substantial floor space for functions with additional compact shelving units that are highly efficient. A structural evaluation of the existing building indicates the basement could accommodate additional loads imposed by the
compact shelving weight. In contrast, due to existing building design loads, compact shelving could not be accommodated in the same density and spacing as on the lowest level (slab-on-grade). Compact shelving on higher floors, to achieve the same density as the lower level, would require significant upgraded and likely costs. Options for modified unit spacing were evaluated for the upper levels. The option that places loads within restricted zones along the structural column band and permits more concentrated shelving units was selected for test fitting in plan layouts. Compact shelving will be distributed on floors three, four and five, while floor two will contain standard stacks. In the long-term plan, compact shelving will account for roughly 46% of floor space occupied by general collections. This represents a reduction in collection space to accommodate additional seating.

- **Student Study Space - Expanding and Augmenting Study/Learning Space**

  The existing Library organization distributes study space across all floors, buffered by stacks and adjacent to highly social areas. This layout produces conflicting user and staff complaints – with noise levels at odds with needs and expectations. With a range of seating styles, study spaces will greatly enhance effective study areas with multiple student and staff preferences. The recommended solution within the LMSP strives to achieve additional seating through the consolidation and reorganization of existing space. Additionally, since students study in varying noise/acoustic levels, silent zones are added. Graduate seating was noted as a shortfall and is now maximized by removing individual space-intensive cubicles to create a central graduate area that allows more seating and greater graduate student access. Additional improvements are highlighted in three areas:

  o **Part A: Increasing Enclosed Group Study Collaboration Space**

    Standard equipment in group study rooms includes whiteboards and laptop and power connections, with some additionally equipped with flat-panel displays and/or computers. Currently there is a shortfall of enclosed collaborative space. Varied group study and media project rooms are identified within the proposed plan to better meet demands.

  o **Part B: Open Study and Collaboration Spaces**

    In the current library configuration, seating and collection materials currently compete for the same desirable spaces – featuring natural light, proximity to services and technology, quiet spaces, and areas for social and academic neighborhoods.

    Adjusting study space upward will create increased quantity and sizes of open group study areas, short-stay computing access, more informal lounge areas, coffee-shop-style counter seating, media project rooms and collaborative workspace. Individual study carrels and table seating will remain the dominant study accommodation; varied seating styles will respond to student preferences identified through the user engagement process.

  o **Part C: Integrated Technology Meeting/Conference/Instruction**

    Existing instruction spaces are over-subscribed, inadequately configured or sized to accommodate workshops offered in classroom and computer labs. Increased instruction capacities within the Library will contribute to overall campus instruction capacity. Substantial meeting and training spaces will provide a wider range of room sizes, as well as sub-dividable flexibility with moveable partitions.

- **Staff and Administration Workspaces - Improving Staff Workflow**

  Staff and administration space has only a marginal increase and responds to the improved ways the Library teams are serving the campus and its faculty and students. In the first floor reorganization, staff and support spaces will relocate to the lower level to improve workflow by eliminating transfer and processing spaces. New furniture will help realize space gains and diminish work areas proportions serving circulation functions. Current Library administration offices are adequate but will be reconfigured for additional offices and workspaces. Offices and workstations will be sized in alignment with the University’s office space allocation guidelines. Other support staff will move to the third floor or other areas to improve workflow. Meeting rooms and consultation spaces are provided to offer additional, flexible space that will improve overall efficiency and improve collaboration and interactions.
E. PROGRAMMING AND GOALS SOLUTIONS

• Improved Access to User Services

User Services has recently experienced an organizational renewal to serve the needs of students and the greater academic community. Therefore, User Services’ space allocations will not change significantly. Redistribution among units will create a shared, centralized hub and reflect circulation efficiencies from the first floor reorganization, with clearer wayfinding to eliminate confusion. Partnering with Collaborative Services will better serve operations and communication for users.

• Archives and Special Collections (A&SC) Space Expansion and Leveraging Location

A&SC will expand the existing archive and storage space, as well as gain capacity when the addition is built and expanded elements of the regular collection are moved into compact shelving, which provides more space in Level 0 for archival material. Highlighting the relationship with research activity, A&SC will gain a public presence for exhibition, a digitization lab, a reading room and multi-purpose meeting space adjacent to the new Research Collaboratory. Most staff workspace, conservation lab and processing functions will remain with archive and storage areas.

• Creating a 24-Hour Zone

A portion of the main floor will become a 24-hour study zone. Red outlines on floor maps will indicate this zone and will include open study seating, café with upgraded offerings, print/copy centre, computer lab, stand-up computer stations and a group study room. The existing Library entrance will become the entry point. Zoned partitions will secure the Library after normal hours.

• Enhancing the Campus Connections through a New Front Door/Lobby and New Community Spaces

Although not necessarily undersized, the current entrance is ineffective because of its configuration. A new lobby will reposition the Library entrance, create greater visibility and improve navigation. A central service hub will be located closer to the entrance to ease service access and navigation. The proposed program also increases space for café service, patron lockers, increased Academic Town Square seating, and dedicated exhibit and display areas. Separate from the assignable floor space is a repurposed roof area with a garden and seasonal outdoor seating.
• Enhancing Campus Partnerships

The Library staff has continually developed support and services for the changing needs of today’s and tomorrow’s students. One example is the Learning Commons which successfully supports academics via the Library – although the name does not capture the varied services and the collaborative spirit in which the Commons operates. The identifier of Collaborative Services will better represent the programs. No space changes are anticipated for the Centre for Students with Disabilities (CSD) Exam Centre or the Science Commons, which have recently occupied independent Library space. Services currently housed behind the first-floor oak wall will realize circulation efficiencies through improved student access. Learning Commons Services such as Learning Services, Supported Learning Groups, Writing Services and Library Accessibility Services (LAS) will share a centralized hub with Public Services, adding functionality and conveniences. These new collaboration zones will be central to improving access to these services.

• Research Collaboratory

The Research Collaboratory is the intersection of research and learning, fostering an active partnership across research domains and creating synergies with existing Library programs. The Research Collaboratory will also encompass the Branch Research Data Centre, the Data Resource Centre, Research Enterprise and Scholarly Communications staff, a new Technology Sandbox for exploration and collaborative research space.

• Enhancing Active Learning

The McLaughlin Library will house some active-learning instruction spaces of collaborative team and group rooms. These spaces will expand the University’s overall capacity, supporting collaborations with other campus academic units. Three floors will each devote 4,000 sf to flexible and active learning.

• Inviting the Academic Community

Looking beyond the sixth floor’s north balcony, a full-height glass partition will separate the sixth floor from new fifth floor reserveable spaces. This area will be equipped for high-quality lecture captures, thesis defense preparation, presentation practices or small lectures. The glass partition will complete an acoustical separation from quiet study spaces nearby.

FIGURE 3.6 Examples of Learning Spaces
• **Graduate Commons Floor**

Existing graduate space consists of closed, reserved, single-person offices and research carrels for graduate and faculty members on three floors.

The proposed LMSP removes most closed offices to capture additional general seating, dedicates various graduate student spaces for quiet and silent study, graduate-only lockers, collaboration pods and a multi-purpose room/presentation practice centre. When the room is not reserved it will be open for general purposes. These graduate areas will enable distinct planning and space layouts to address acoustic separation.

• **Maximizing Flexibility**

Similar to the capabilities planned for the Active Learning instruction space, first floor meeting and second floor multi-purpose rooms maximize flexible space usage to meet the Library’s changing needs. Workshops and training sessions of varying sizes and other meeting needs can be accommodated.

The existing building organization has undergone incremental change as programs and services have been added and, in many aspects, it has produced improvements to circulation, accessibility and the overall student experience. However, as Library space has become increasingly limited, alterations have not always benefitted from a holistic planning outlook or long-range vision, as remnant spaces emerged and ad hoc infill has taken place. The LMSP develops a framework to make informed decisions, enact transforming steps and to support the University’s academic mission in a highly dynamic mode.

To quickly understand the overall programming organization, sectional stacking diagrams have been used to test the impact of choices made within individual floors on the broader experience of the building. The basic activity level of each floor will remain in the proposed plan, but new and distinct spaces created on each level will accommodate and serve to moderate a greater range of activity and noise levels.
FIGURE 3.11 Existing Program Plan - Levels 2-3
FIGURE 3.12 Proposed Interim Plan - Levels 4-5
FIGURE 3.13 Proposed Interim Plan - Levels 6
FIGURE 3.14 Proposed Interim Plan - Levels 0-1
FIGURE 3.16 Proposed Interim Plan - Levels 4-5
FIGURE 3.17 Proposed Interim Plan - Levels 6

Level 6

GRADUATE ONLY ACCESS
QUIET STUDY LEVEL

OPEN TO BELOW

OPEN TO BELOW

9 CLOSED-OFFICES
THIS LEVEL

SILENT
STUDY ROOM

GLASS ENCLOSED
TO BELOW

GROUP STUDY ROOMS
(DISCUSSION
PERMITTED)
FIGURE 3.19 PROPOSED LONG-TERM PLAN - LEVELS 2-3
FIGURE 3.20 PROPOSED LONG-TERM PLAN - LEVELS 4-5
04. IMPLEMENTATION

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B. PROJECT PHASING  54
C. OPINIONS OF PROBABLE COST  57
FIGURE 4.1 Proposed New Addition and Entry
A. TRANSFORMATION OVER TIME

**Today:** The Library is constrained by difficult circulation patterns and navigation, limited group study and collaboration spaces, and lack of power capacity, acoustical controls and responsive climate regulation. Efforts have been undertaken to create seating gains and an improved environment, but a plateau has been reached in the existing space organization. Further investment is needed.

**Interim:** Before an addition is built, an interim planning period will bridge long-term plans – by renovating the existing building and adding seating and service capacity incrementally. A new north-facing entrance on the existing Library will announce the significant renewal taking place on the interior.

**Long Term:** The long-term plan achieves the target planning goals for study and collection spaces, by an addition to the McLaughlin Library. This final stage visually marks the complete exterior transformation.

B. PROJECT PHASING

The project plans illustrate phases to achieve the Library’s desired program (Figure 4.2). Some contain stand-alone projects that can be accomplished as funding becomes available, while others must be coordinated within the larger context of project goals. The long-term plan contains a 58,000 GSF addition to the existing McLaughlin Library (262,133 GSF).

Decision variables that must be evaluated before each phase include:

- All current users should remain in operation during construction.
- Requirements for temporary space (displaced building users and services) during construction.
- Total number of moves involved for users or staff.
- Availability of off-site storage to facilitate construction phases.
- The mechanical system design will need to be planned to convert from a constant air volume system to a variable air volume zoned system.
- The electrical system will require upgrades for additional power loads.
LONG-TERM PLAN

PROJECT PHASES OVERVIEW

CREATE 24-HOUR ZONE ON FIRST FLOOR

- REPLACE FORSTER RM W/ CAFE & TOILETS
- EXPAND ILL STAFF FOR TEMP CIRC SPACE
- RELOCATE CIRC/RESERV TO TEMP
- REPLACE CIRC. BUNKER W/ COMP LAB & COPY CTR
- SECURE BOOKS & PARTITION @ 24HR ZONE

-16 SEAT LOSS

CREATE GRADUATE LEVEL ON 6TH FLR

- DEMOLISH CLOSED OFFICES
- CLOSE-OFF OPEN STAIRS TO 5TH FLR
- ADD CARD ACCESS
- ENCLOSE BALCONY W/ GLASS OVER 5TH FLR NORTH
- INSTALL LOCKERS OUTSIDE DOORS & COMPLETE FF&E

+60 SEAT GAIN

CREATE FL 4 ROOF PATIO SEATING

- INSTALL PAVERS & GUARD RAILINGS
- REPLACE ROOF DOORS

+100 SEATS

LOWER LEVEL COMPACT SHELVING PART 1

- DEMOLISH MEETING/COMP. CLASS/INTERNAL CORRIDOR
- REPLACE STACKS W/ COMPACT USE PORTION FOR A&SC
- BACKFILL UPPER FLRS W/ SEATING

+190 SEAT GAIN

REMOVE CLOSED OFFICES ON FLOORS 2 & 3

- DEMOLISH CLOSED OFFICES
- FURNISH WITH TABLES & CHAIRS

+42 SEAT GAIN

DECHANT THE OAK WALL INHABITANTS

- CONSTRUCT FLR0 SOUTH OFFICES
- RELOCATE FL1 STAFF TO NEW FLO OFFICES
- RECONFIGURE TEMP FL1 HELP CENTRE
- RELOCATE FL1 STAFF/SERVICE TO FL2 TEMP WORKSPACE

-110 SEAT LOSS

CONSTRUCT SPACE BEHIND THE OAK WALL

- CONSTRUCT LEARNING COMMONS & STAFF AREAS
- CONSTRUCT MEETING/INSTRUCTION ROOMS
- TAKE DOWN OAK WALL

+52 NET SEATS

TRANSFORM FIRST FLOOR PUBLIC SPACE

- CONSTRUCT NORTH ENTRANCE & VESTIBULE
- CONSTRUCT NEW HELP HUB
- REMAINING RENOVATION OF FIRST FLOOR (INCL ACADEMIC T.SQ)

+96 SEAT GAIN

A&SC EXPANSION PROJECT

- FLO: ARCHIVES COMPLETES STORAGE EXPANSION & RECONFIGURATION
- FL2: CONSTRUCT ARCHV&SC EXHIBIT READING & MULTI-P.

+80 SEAT GAIN

INTERIM PLAN

1. FIRST STEPS TO TRANSFORMATION
   - $5.3 MILLION

2. TRANSFORM MAIN LEVEL & LOWER LEVEL
   - $26.6 MILLION
**LONG-TERM PLAN**

**VER LEVEL**

3 **REMAINING WORK ON LEVELS 2-5**

6.6 MILLION

4 **BUILD ADDITION**

$18.9 MILLION

$24.5 MILLION

---

**RENOVATE FLOOR 5**

- **CONSTRUCT THESIS DVPMT RM**
- **INSTALL COMPACT SHELVING**
- **REMAINING RENOVATION OF LEVEL** +80 SEAT GAIN

**RENOVATE FLOOR 4**

- **CONSTRUCT GRP STUDY RMS**
- **INSTALL COMPACT SHELVING**
- **REMAINING RENOVATION OF LEVEL** +70 SEAT GAIN

**COMPLETE FLOOR 2**

- **CONSTRUCT OPEN ED LAB & MEETING**
- **CONSTRUCT RESEARCH COLLABORATORY**
- **REMAINING RENOVATION OF LEVEL** +76 SEAT GAIN

**RENOVATE FLOOR 3**

- **CONSTRUCT GROUP STUDY RMS & STAFF OFFICE SPACE**
- **ENLARGE MEETING RM 384**
- **RECONFIGURE ADMIN. SUITE**
- **INSTALL COMPACT SHELVING**
- **REMAINING RENOVATION OF LEVEL** +180 SEAT GAIN

**SITE WORK**

- **CONSTRUCT ADDITION**

- **FIT-OUT INSTRUCTION SPACES**

- **INSTALL ONE LEVEL COMPACT SHELVING** +820 SEAT GAIN

**INSTALL ONE LEVEL COMPACT SHELVING**

**CONSTRUCT NEW HELP HUB**

**REMAINING RENOVATION OF FIRST FLOOR (INCL ACADEMIC T.SQ)**

**CONSTRUCT ADDITION**

**OVERALL** +1607 SEAT GAIN

**FIGURE 4.2 Project Phasing Diagram**
C. OPINIONS OF PROBABLE COST

The costs outlined below (Figures 4.3) summarize the projects by phase, and coordinate with numbered phases in Figures 4.4 - 4.7. Deferred maintenance costs not directly triggered by projects are not included. Costs are given as order of magnitude, and a detailed spreadsheet was prepared as a separate table.

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* excludes deferred maintenance costs unless triggered by projects
## Costs by Project

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**FIGURE 4.4** Phase 1 Projects Costs

* * excludes deferred maintenance costs unless triggered by projects

### 2. Transform Main Level & Lower Level

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<td>Furniture &amp; Technology</td>
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**FIGURE 4.5** Phase 2 Projects Costs

* * excludes deferred maintenance costs unless triggered by projects
### 3. Remaining Work on Levels 2-5

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**Site Improvements**

**New Construction**

- Compact Shelving
- Furniture & Technology

| Total | $2,881,000 | $3,394,000 | $6,653,000 | $5,930,000 | $18,858,000 |

**FIGURE 4.6 Phase 3 Projects Costs**

### 4. Build Addition

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<td>Existing Renovation *</td>
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**Site Improvements**

**New Construction**

- Compact Shelving
- Furniture & Technology

| Total | $27,473,000 | $27,473,000 |

**FIGURE 4.7 Phase 4 Projects Costs**

* excludes deferred maintenance costs unless triggered by projects
A. SITE AND FACILITY ASSESSMENT 61
B. DETAILED PROGRAM 64
C. BUILDING SYSTEM EVALUATION AND ASSESSMENT 69
The development of a far-reaching, transformational plan for the McLaughlin Library was built on a solid foundation of stakeholder input from the University of Guelph community. The research and input that created this base provided valuable insights and helped establish development touch-points for project initiatives.

The LMSP-WG garnered facts on the current Library Status, including the physical conditions, organizational realities, opportunities and constraints. We hoped to gather a sense of place – what makes the McLaughlin Library unique and why it’s an integral facet of the University of Guelph’s campus.

The recommendations of the LMSP were informed by previous findings, constituent group interviews, staff surveys and visual observations of the facility in operation.

A. SITE AND FACILITY ASSESSMENT

McLaughlin Library is the central Library serving the main University of Guelph campus. It is affiliated with the University of Guelph-Humber Library and three regional campus sites at Ridgetown, Kemptville and Campus d’Alfred, and a portion of the Library’s collection is housed in an off-site storage facility.

The Library’s main entrance is located on Winegard Walk, a primary pedestrian spine leading north from College Avenue toward the heart of the Guelph campus, across from University Centre and transport links at the University Centre bus loop.

The building comprises 261,151 gsf of open stack space, study space, reading rooms, offices, meeting rooms, computer labs and several academic partnerships found throughout the building.

McLaughlin Library has been open since 1968. An addition to the building was planned but never built. Taking into consideration the building’s age and its intensive use with only minor alterations, the facility is due for a comprehensive renovation and necessary upgrades to both finishes and systems. The building appears structurally sound and its basic structural layout has proved a flexible container for multiple uses, but the solidity of its concrete frame also leaves it relatively inflexible to structural alterations that would be difficult and costly.

In general the building appears to be in stable condition, although its primary mechanical and electrical infrastructure is original. Previously documented conditions exist that indicate numerous deficiencies in building systems, infrastructure, finishes, furnishings and fixtures, and presence of hazardous materials. Significant renovations will likely trigger necessary upgrades and remediation impacted by construction to bring the building up to a level that meets current building code standards. This potential is considered, therefore, in planning which existing areas may involve associated costs to address systems generally categorized as deferred maintenance.

Consultant engineering firm MCW has reviewed the existing mechanical and electrical systems to assess suitability for the proposed plan. Halsall Associates evaluated structural systems and assisted in the analysis of structural capacity for compact shelving scenarios.

- Background Documents Review

During recent years, several studies have been conducted on McLaughlin Library to investigate conditions, deficiencies and general status. While these studies have mostly been generated by consultants, the Library itself engages regularly in its own studies. The project team received numerous background documents to review, in connection with the master space plan effort.

The following is a compilation of the reports:

- Library - Building Program and Brief to the Architect 1965
- Archives & Special Collections Final Accommodation Study Report 2011
- COU Library Space Report update 2012
- COU Study Space Report 2012 per PR (Physical Resources)
- COU Report 2010 library room data
- Edited Library Space Budget Request 2012
- Full Library Space Budget Proposal 2012
- Inventory of Public Furniture Report 2009 and 2012
Library Collection Management Plan
Library rooms by COU code
Library Integrated Plan 2012-2017
McLaughlin Library Space Planning as of March 2011
Principles per Caruthers Shaw 2003 – 2005
As-built pdfs (scans of original drawings)
Measured base plans (CAD)
VFA full condition audit of building 2012
Hazardous materials survey 2012
User Experience Studies (2010-2012)
Accessibility Reports 2005, 2007
Construction and Alteration History

Summary of significant upgrades and renovations that have been completed at McLaughlin Library:

1990 - Archives & Special Collections area enlarged, first floor service redesigned
2002 - Renovations on second and third floors created Math & Stats Learning Center and temporary offices for College of Arts
2003 - Fire Alarm system major upgrade/replacement of transformer
2005 - Renovations on first floor created Learning Commons and Williams Coffee Pub, installed new lounge seating, carpet, front doors and electronic gates
2006 - Relocation of Data Resource Centre to first floor
2009 - Lighting Retrofit Phase 1 project installed energy efficient fixtures and controls (which did not exist) for shut off.
2010 - Relocation of LAS
2010 - Creation of BRDC for research
2010 - Roof replacement for fifth floor roof
2011 - Lighting Retrofit Phase 2 project to allow control of non-emergency lighting functions
2011 - Creation of the Science Commons and renovation of Mathematics and Statistics Lab
2011 - Creation of the Centre for Students with Disabilities Exam Centre on second Floor
2012 - Accessibility retrofit for sixth floor LAS study rooms
2012 – Universal Toilet Room and first floor user services rework
## B. DETAILED PROGRAM

### Library Master Space Plan Program

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**TOTAL**

**Note:** The numbers in the table represent the space areas in square feet (SF) or areas in units (UT).
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UNIVERSITY OF GUELPH | LIBRARY MASTER SPACE PLAN APRIL 2014
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Preliminary Mechanical and Electrical High Level Review for UNIVERSITY OF GUELPH Guelph, Ontario

Prepared for: CANNON DESIGN 200 University Avenue, Suite 1200 Toronto, ON Canada M5H 3C6

Prepared by: MCW Consultants Ltd. Queens Quay Terminal 207 Queens Quay West, Suite 615 Toronto, ON M5J 1A7

Dated: March 2014
MCW File No. 8932
Revision: 04
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1 PURPOSE
The purpose of this report is to assess the existing mechanical & electrical systems and the suitability of these existing mechanical & electrical systems for the proposed renovations (phases 1 thro 3) & the new build Expansion works (phase 4) as highlighted in the latest draft plan proposals through Cannon Design on the 14th of November 2013 Titled “Library Master Space Plan”.

2 PROJECT DESCRIPTION
The current library building was constructed in approximately 1966 and consists of 1 basement level, ground floor and levels 2 through to 6 of occupied space with two small levels located on the 7th floor & Sub basement levels covering mechanical and electrical service room space.

The library master plan has been broken down into four phases which can really be grouped together into two distinct levels of workings. Phases 1, 2 and 3 being a refurbishment and part retrofit along with a partial reorganisation of the existing library space. Phase 4 is a new build, consisting of a 58,000 sqft new extension to the existing library from the ground floor upto the 5th floor. For a more detailed analysis please refer to the Cannon Design “Master Space Plan” document.

The existing and proposed new build library covers a whole range of requirements from offices, meeting rooms, individual and open study space, computer labs/zones, book storage, café, etc., but also encompass more unique feature spaces such as;

- Book vault for special collections and rare books
- Conservation laboratories
- Digitization room
- Archives & special collections exhibit room

3 EXISTING BUILDING MECHANICAL SERVICES
3.1 General
Mechanically the McLaughlin library building’s primary source of heating and cooling is from central boilers and chillers located in building 55, Central utilities plant building. This centralised steam and chilled water is distributed around the campus and fed to the McLaughlin building via an underground tunnel. Therefore there is no major heating or cooling generation equipment located within the McLaughlin library building.

Within the basement of the McLaughlin library the main mechanical room takes this central steam supply and converts this into heating water which in turn is then distributed around the building via a number of circulating pumps to serve the perimeter hydronic convectors and radiators as well as a number of reheat coils. Steam and chilled water is also run from here to each air handling unit and provides heating and cooling as necessary.

3.2 Air Conditioning
The McLaughlin library is conditioned by 5 separate air handling units. Four of these units serve the complete library building from the basement level upto the 6th floor level whilst the fifth air handling unit which used to serve the rare book collection. The rare book collection was located in the basement floor in 1966 at the SE corner between grids 1&3 and H&K. (See next section for further information). As the rare book collection has since been relocated within the basement floor, this fifth air handling unit now just serves a small section of the basement floor plate along with the other four air handling units.
All five air handling units are located on the 5th & 6th floors. Each air handling unit typically has a (steam) pre heat and main heating coil, cooling coil, filtration and a spray type humidification system. This type of humidification system is no longer allowed to be used as it utilises a sump of water within the air stream and constantly pumps and sprays water onto the coils. The water within the sump or the feed water to this system cannot be treated chemically and so most of these units throughout the country have been shut down and abandoned due to health concerns and we can only surmise that this is also the case for this building. This would tend us to believe that there is probably no humidity control at this time within the building.

Apart from AHU No.5 which serves only a small portion of the basement floor the four other AHU’s rather than serving a single floor or perhaps two floors each, serve a quadrant of each and every floor plate. Each air handling units distribute their conditioned air throughout the building via mechanical risers located roughly one in each of the 4 corners of the building. The supply air from these air handling units is then delivered to a series of in-ceiling induction boxes on each floor and then the conditioned air is delivered to the occupied spaces in a number of ways through slot, diffusers, combination light troffers/diffusers, grilles, etc.

It should be noted that the in-ceiling induction boxes are basically obsolete today. These induction boxes utilise high velocity primary air to “entrain” or “induce” room air adjacent to the high speed primary air and mix to deliver a higher volume of supply air than the primary air. There are a number disadvantages with this system but one of the main disadvantages of this particular type of system is noise. Due to the high velocity of air being squeezed through a small opening it is impossible not to generate noise and it is noted that some areas in the library have had and continue to complain of noise issues. This is not the only noise source but it is a significant contributor to the issue.

The perimeter or façade of the building is heated by low level or trench heating convectors / radiators and is independent of the overhead air system. It should be noted that when the perimeter heating is taking care of the buildings heating requirements the overhead air induction system still has to be run which is not the most efficient use of energy.

3.3 Rare books

The original 1966 drawings show that within the basement there used to be a dedicated room in the SE corner (gridlines 1-3 & H-K). It is presumed that this dedicated system was used to provide specific conditions to protect these special and delicate documents. It is noted that on the latest existing layouts that this rare books room has since been relocated within the basement area to a new location but that the existing air conditioning/AHU and ductwork was not relocated to protect the rare book collection in their new location. However it was also observed that a dedicated DX split system has been installed and operates within this area which will be able to control temperature but will not have any control over the humidity in this room. Humidity control is usually important in the preservation of important documents so this situation is far from ideal.

3.4 Building Management System

The existing McLaughlin building management controls system is predominantly a pneumatic controls type system with some controls having been switched out in preference to an electronic based system. When new, pneumatic controls can function just as well and in some case better than an electronic type controller but it should be noted that the electronic controls system is by far the industry standard today. The downside for a building management system utilising pneumatic controls is the individual pneumatics controls require significant maintenance to keep them working and this maintenance typically only increases over time. Pneumatic control systems also require an air compressor to provide a constant supply of compressed air throughout the building which in turn is another component that will require continual maintenance. If this air compressor ever fails the controls system will lose all ability to control all of the mechanical building services.
3.5 Miscellaneous

There is little in the way of energy recovery on the air side with all of the return air from the building being either recycled and reused or simply dumped to outside. The exhaust fans as scheduled on the original drawings are dumping in excess of 31,000cfm in total.

All of the mechanical systems are 40+ years old and appear to be beyond the end of their useful life.

The Asset & Prime system report dated 17th of October 2012 stating that many of the mechanical systems contain asbestos either in joints or in the insulation surrounding the ductwork and pipework as well as numerous building components (see page 9 of the asset and prime system report).

The Asset and Prime Systems report also states that many of these mechanical systems do not function correctly and that there are many areas with poor or uncomfortable conditions (see page 31 of the asset and prime system report). Contributing factors to the poor conditions may include but not limited to, failing controls, imbalance of heating and cooling systems, lack of humidification, worn out or broken components, etc.

It is noted that the drawings indicate that hydronic heating has been installed in each elevator machine rooms which is now not permitted. Any modifications to the elevator equipment in these rooms will require this to be updated to meet code.

3.6 Fire Protection

Currently the McLaughlin Library building is protected only by a standpipe system and with fire hose cabinets located on each floor at each stair core. The McLaughlin Library building has no sprinkler coverage. In the main basement mechanical room there is also a very small 7.5hp fire pump rated at 70gpm at 160ft head to boost the water pressure of this system.

3.7 Plumbing

Domestic cold water
Domestic cold water is boosted centrally and distributed around the building to each floor predominantly to serve the washrooms.

Domestic hot water
Domestic hot water is produced centrally via a steam to domestic hot water convertor and this domestic hot water is distributed around the building to each floor predominantly to serve the washrooms.

3.8 Drainage

Storm water
There is a standard storm water system collecting all the rainwater from the roofs and this is discharged by gravity to the storm water system at basement level (300mm) leaving the building to the North.

Sanitary Drainage
There is a standard sanitary drainage system serving each floor and this is discharged by gravity to the Sewer system at basement level (200mm) leaving the building to the North.
4 MECHANICAL CONCEPT STRATEGIES FOR RENOVATION PHASES 1, 2 & 3

4.1 General

The University of Guelph is careful with energy usage and works under the objective to reduce the energy usage where feasible and where it is cost effective.

It is noted that most if not all of the major equipment (heat exchangers, AHU’s, fans, motors, etc.) are technically at the end of their expect life. These units could either fail without warning or last for some time but for the purposes of this exercise we have assumed that these pieces of equipment will not be replaced at this time unless there are sufficient funds in place to do so.

However we are recommending some modifications to the existing air handling units some of which will be required if option 2 is the selected route and some of which are for reducing the energy consumption of the building.

4.2 Asbestos

It is assumed that the asbestos issues will be dealt with as an ongoing basis throughout the building. Whilst it does not affect the mechanical system/s operation it will add extra over cost when modifying, relocating, repairing, replacing, etc., any mechanical systems that have asbestos containing materials in them or on them.

Disruption to the HVAC air systems is inevitable and will more than likely require whole systems to be shut down at any given time which will require careful planning and timing when this asbestos is abated from building materials and or mechanical systems.

4.3 Perimeter Heating

The proposed phase 1, 2 and 3 layouts will require very minor modifications to the existing perimeter heating system and only where new walls are either introduced or removed will the perimeter heating need to be modified to ensure that it is properly coordinated with the internal structure.

However consideration should be given at this time for the future phase 4 proposed extension and if this phase or works proceeds the perimeter heating associated with the interconnected façade space will require modification to allow these heating units to be abandoned and allow the existing system to continue to function. It would be recommended that as these existing floor areas are refurbished, new heating pipework be “teed” and valved into the existing pipework before and after the proposed section of exterior wall that is destined for demolition. This will allow for ease of removal of the redundant section without having to re-enter the newly finished area and install this pipework retroactively into a finished space.

This work could be carried out in the new extension space but will likely face difficulties as no doubt there will be significant structure to deal with between the existing and new structures. This would also have a likely knock on effect of shutting down the existing heating system in the newly refurbished library for removal of the existing redundant heaters and tying in the new heating system which could be avoided.

4.4 Air Handling Units

In the Asset & Prime system report dated 17th of October 2012 states that all units including the exhaust fans are beyond their useful life. Whilst this is strictly true the units are still functioning but their longevity cannot be guaranteed. It was also observed on site that these units have “Variable Inlet Vanes” (VIV) on the fans which would give a level of volume control it was noted that these were only operating between 80% & 100% duty if they operated at all.
Depending on the solution chosen for the existing library space air distribution system, these Air handling units will require a VFD (see option 2) installed on the supply and return fans if a VAV system is the preferred choice. If the in-ceiling induction units (see option 1) are retained, refurbished or replaced with similar them the VIV control could be maintained/repaired or replaced as a minimum but preferable VAV control should be installed on the supply and return fans. This will require some reprogramming of the building management system but will offer greater energy savings than the VIV control option. However it should be noted that the air volume for option 1 should be controlled only between 50% and 100% to maintain the integrity of the air system and allow them to function without causing potential issues of localised discomfort or lack of air distribution and this in turn will not maximise the potential energy savings for the installation of VFD drives on the fan motors.

Other Considerations
If the existing air handling units are retained then there are a couple of modifications to consider. The first consideration is energy recovery. Currently there is no energy recovery on any exhaust air within the building and to comply with current code the building supply air systems will have to deliver somewhere between 31,500 and 49,000 CFM of fresh air by the end of phase 3. This is a significant amount of air to be thrown away and brought into the building and some form of energy recovery would certainly reduce the energy required to heat up or cool down the fresh air intake in the winter and summer months. As all the air systems are existing the only real option available without major intervention into the air systems would be to install a series of run around coils into the fresh air intake ductwork and exhaust air ductwork. Run around coil systems are not as efficient as some other energy recovery options but this is the only feasible option available at this time.

The second option to consider is to reintroduce some form of humidification. As the existing humidification system has been disabled some time ago a new humidification system may be considered especially for the rare book zone AHU.

4.5 Major Ductwork Distribution
The distribution ductwork from each air handling unit as noted previously is a vertical distribution rather than a horizontal distribution in that each air handling unit serves all floors from the 6th Floor down to the basement floor instead of each unit serving just one or possibly two entire floors. This existing mechanical design strategy and the strategy for the McLaughlin library refurbishment phases will have a large bearing on how the existing mechanical air conditioning is dealt with.

The major ductwork risers and in fact the main ductwork run outs on each floor that serve the current induction unit boxes are in relatively good state of repair it is not envisaged at this time that any of this ductwork is replaced other than minor modifications to suit the proposed new layout. This major ductwork distribution has sufficient capacity to provide air for both options 1 & 2 below.

However the new 24 hour zone on the ground floor and the rare book collection area on the basement floor provide their own challenges with respect to providing individual control and depending on the final solution may require significant intervention to the major ductwork distribution.
4.6 Existing & Proposed Air Conditioning Design

Existing Air Conditioning Design

The air distribution throughout the library to the occupied space is generally done with in-ceiling induction units. Currently there are approximately 409 existing in-ceiling units as follows;

<table>
<thead>
<tr>
<th>Floor Level</th>
<th>No of units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement</td>
<td>69</td>
</tr>
<tr>
<td>Ground</td>
<td>88</td>
</tr>
<tr>
<td>Second</td>
<td>79</td>
</tr>
<tr>
<td>Third</td>
<td>83</td>
</tr>
<tr>
<td>Fourth</td>
<td>33</td>
</tr>
<tr>
<td>Fifth</td>
<td>27</td>
</tr>
<tr>
<td>Sixth</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>409</strong></td>
</tr>
</tbody>
</table>

These induction units are again noted in the Asset & Prime system report dated 17th of October 2012 to be beyond their useful life and whilst many are still functional upon our visual inspection it was noted that a number where “whistling” or had seized dampers and therefore were working less than perfect. This failure of units is only going to increase over time.

With respect to the refurbishment sequence of the McLaughlin building there are two main options available to consider which are as follows;

In-ceiling Induction units

The in-ceiling induction units would be retained on existing spaces but as each level and phase is refurbished then it is recommended that these in-ceiling induction units are replaced with VAV boxes and that the system is converted from a constant volume system to a variable volume type system. This would basically retain the existing ductwork infrastructure in its entirety with the relocation of downstream or terminal ductwork, diffusers, etc., to suit the revised layout as necessary.

The ground floor area highlighted to be 24-hour operation will be difficult to separate in terms of air conditioning in the systems current configuration but over time this problem becomes less of an issue as each area is converted to a variable air volume type system. At present there is no control on the AHU’s to reduce flow and there is no way to isolate the ground floor from the other floors or the ground floor from the rest of the ground floor. Either a short term running of all the air systems is maintained to facilitate the use of the ground floor during the unoccupied periods of the building or if deemed necessary another option would be to add motorized dampers to supply ductwork on each floor. This is slightly complicated in that each duct riser enters the ceiling of each floor with a large plenum box and typically there are a minimum of six supply dampers per plenum box. This would entail approximately 24 to 30 motorized control dampers on the supply side and at least 4 motorised control dampers on the exhaust side per floor to allow the unoccupied floors to be shut down at night.

The cost of this temporary solution compared to the cost of the energy usage over and above that used when the building is in night set back would need to be calculated to see if this short term fix was cost effective or not. The duration of the refurbishment from phase 1 to completion of phase 3 would be critical in this analysis.
Variable Air Volume Units

It is recommended that as each space is refurbished that the existing induction units are replaced with VAV boxes. The first advantage of replacing the induction units with VAV boxes will be that only the required amount of air conditioning to each space is supplied instead of a constant supply of condition to all areas occupied or not as in the induction type system. The second advantage is that the VAV system will offer much greater energy savings throughout the year due to the increased controllability of the system. Thirdly as there is a proposed section of the building going to be 24hr operation it will be very simple to shut down the unoccupied areas and only serve the occupied zone by closing VAV boxes as necessary on the unoccupied floors further increasing the energy savings by not running the whole building for just one area.

VAV and induction units on the same system will not function as well together so if the refurbishment phases 1, 2 and 3 works are to be extended over several years then replacing the existing induction units with new VAV boxes may cause some issues with the overall system until such times as the entire building is converted. This type of changeover on existing air distribution systems from constant volume to variable volume has been carried out on many projects and can be accommodated. During each phase it will be necessary to reprogram some of the building management controls system to keep these issues to an absolute minimum.

From a mechanical perspective the replacement of the induction units with VAV boxes will offer energy savings over the existing system whilst giving the occupants an increased level of comfort as well as a much greater level of control of their environment.

In addition the air handling unit fans would need to be fitted with variable frequency drives at the very minimum if the AHU's themselves are not being replaced at this time.

Rebalancing the air system

It is highly recommended that the building air systems are rebalanced not only after each phase of works is carried out but also a full system balance for each AHU on the completion of the refurbishment works. This will not only improve the HVAC system performance and comfort levels within the library but will maximise energy savings and no doubt assist in alleviating both localised and overall noise issues in some areas of the library.

4.7 Noise Control

It has been noted that there is a noise issue generally within the McLaughlin library building and the mechanical system in part contributes to this noise issue. Measure that should be implemented to assist in reducing this noise would include;

Return air ductwork

The mechanical systems utilise the ceiling void as a return air path and this creates a path for noise to transmit from one area to the next particularly from office or meeting rooms to adjacent spaces. It is highly recommended that when the new office spaces, meeting rooms etc. are designed that the walls are installed slab to slab and not slab to ceiling. This will allow the mechanical contractor to install cross talk attenuators or internally lined ductwork installed in a “U” or “Z” shape to mitigate noise transfer from one area to the other and also give a level of speech privacy to these areas.

Supply air ductwork

From our observations the existing in-ceiling induction units are noisy and are transmitting this noise to the occupied space both radiated noise and airborne noise.

Ideally it would be best to replace these in-ceiling induction units to eliminate this noise source with something that generated less noise but if this is not feasible then acoustically lined ductwork from the units to the supply diffusers and acoustically lined plenum boxes on the supply diffusers should be installed. This will assist in mitigation of the background noise attributed to the mechanical systems and in particular the noise within the supply ductwork but will not deal with the break out noise from the induction units themselves.
4.8 Supply Diffusers & Grilles

Due to the new layouts a number of diffusers and grilles will require to be relocated and a number of these will be required to be replaced to suit the new room layouts or ceiling types. An allowance should be made to replace a significant percentage if not all of the diffusers with new particularly where supply diffusers have been integrated into the light troffers as it is assumed that these will all be replaced with new light fixtures.

4.9 Specialist Rooms

Only the rare book collection space currently has a separate air conditioning system instead of the common building air conditioning system. As noted previously the original building utilised the fifth AHU to protect this area but since then the location of the room has moved without the ductwork being modified to suit. It appears that at some point a split system has been installed to provide heating and cooling (or temperature control) with a condenser mounted in the 6th floor mechanical room for this space. This does not give any humidity control either by dehumidification or humidification.

Phase 2 of the refurbishment works encompasses the areas occupied by the rare book collection. There are any number of options available to service this space but it is recommended that the two existing systems are utilised as follows;

The existing fifth air handling unit should be used to serve the new rare book collection area with the main ductwork and distribution ductwork altered to suit the new room configuration as necessary. The other existing AHU's ductwork can be reconfigured to cover the zone vacated by the ductwork from the fifth AHU. This in itself again would only give temperature control and therefore the fifth AHU would require some modifications to allow for humidity control. This could easily be achieved by introducing say a heat pipe system to allow sub cooling and reheating for dehumidification purposes and the addition of a new humidifier for humidity control in the winter. Unfortunately space is tight in the mechanical room and there may not be sufficient space in the mechanical room to install all of these additional components. If the space cannot be found to expand this mechanical room to accommodate or install all of the components within the mechanical room then some components such as the humidification may need to be installed elsewhere within the ductwork distribution. Whilst this is not ideal it still can be made to work.

This refurbishment would give the necessary temperature and humidity control to ensure an optimum environment for the preservation of these rare and irreplaceable books.

However due to the nature of this specialised area it is highly recommended that a back up system is in place to protect this area in the event of a failure. The existing mechanical room does not offer any real opportunities to allow for increasing the AHU size to incorporate two fans, separate coils or indeed a separate standby unit. Therefore it is recommended that the existing DX system is also retain or replaced with new to provide back up in the event of a catastrophic failure in the primary system such as a coil burst, etc. which could take several weeks to replace.
4.10 Fire Protection

As mentioned previously, the McLaughlin Library building is protected only by a standpipe system and fire hose cabinets and does not have any sprinkler coverage.

A code consultant should be consulted as any major refit is extremely likely to trigger the requirement for a full sprinkler system to be installed within the building. If in the unlikely event that this does not happen it would be highly recommended that at the very least, consideration should be given to protect the rare books and/or the special collection rooms.

Based on the assumption that a new sprinkler system will be required to be installed throughout the building, prior to or as part of the phase 1 works a room will require to be created to house both a new sprinkler tree/header and a new fire pump. The existing fire pump is far too small and will not comply with current code. At this time a new fire department Siamese connection will also need to be installed on the outside of the building. The last item pertaining to the fire protection infrastructure would be the requirement for a new (Approx.) 200mmØ fire main being brought into the building to service the new sprinkler room.

This room could be located on the lower level and installed during the phase 1 works on that level. In addition two sprinkler risers will need to be installed c/w shut off valves at each floor to allow the gradual introduction of the sprinkler services on each floor as the building is renovated. All of this work should be carried out prior to any renovation works taking place.

Once this “backbone” sprinkler system has been installed then the installation of sprinklers thorough the building can proceed and be phased floor by floor without further disruption.

Supervised valves and flow switches would be installed on each floor and this along with all the other alarm points will need to be connected to the fire alarm panel as and when they are installed.

Rare & Special Book Collections

As mentioned above due to the nature of the contents of this space it would be prudent to protect the rare book and special book collections with their own fire suppression system particularly if the building itself is somehow granted an exemption from code requirements.

The protection of these books or materials can done in a variety of ways either using a standard sprinkler system, or if the potential of accidental discharge of water is too much of a risk then a pre-action sprinkler system with cages or fully recessed sprinkler heads would offer a further layer of protection.

Ultimately if water is going to cause as much damage as fire to the book collection a gaseous suppression system such as argonite, inergen, etc., could be considered but this would come at a premium cost over the other two options but would provide a better level of protection without causing any potential water damage to the books or rare materials stored in this location.

4.11 Plumbing

Domestic Hot & cold water

Generally the proposed McLaughlin library refurbishment works has very minimal impact on the domestic water services with the main item being a new Café that is being introduced on the ground floor. From a mechanical perspective the easiest solution is to extend the new hot and cold domestic water pipework to below and connect into the existing domestic water pipework that serves the nearby washroom group in the basement. However this involves intervention into a proposed phase 2 space so either temporary works will be required or the phasing will require to be altered slightly to accommodate these changes. If this cannot be done then the new domestic pipework for the café and washrooms can be extended in the ceiling space on the ground floor to the washroom block which is at the other side of the building.
4.12 Drainage

Storm water
In Phases 1 & 2 the existing storm water drainage system should have a suitable sized pipe extended to the ceiling void of the ground floor and capped off adjacent to the location of the phase 4 future extension for future connection when this extension is built.

Sanitary Drainage
Generally the proposed McLaughlin library refurbishment and extension works have minimal impact on the existing sanitary drainage system. However in phase 1 a new Café and two new washrooms have been introduced on the ground floor. As most of this drainage pipework will be installed below the floor in the basement level some temporary works or reorganisation of the phasing in this location will need to be looked at. Extending this new sanitary waste drainage pipework and connecting into the existing pipework at the adjacent washroom block in the basement should be straightforward.

5 MECHANICAL CONCEPT STRATEGIES FOR PHASE 4 NEW BUILD EXTENSION

5.1 General
As this will be a completely new space and due to the fact that the existing mechanical equipment is not designed to accommodate this new extension any mechanical air condition for this extension will have to be provided from a new source. The following sections 5.2 to 5.7 highlight the proposed mechanical services that would be appropriate for this new additional space.

5.2 Perimeter / Façade heating
The existing principal used in the main McLaughlin library is a sound one whereby hydronic perimeter convectors and radiators are used and it would be recommended that a similar approach be taken for the phase 4 new extension. A new heating water riser would be required to service this hydronic heating system and as a new mechanical room will be required for the air condition air handling unit it would be an ideal location to have a steam to hot water convertor in this mechanical room along with the necessary distribution pumps, controllers etc.

5.3 Air conditioning
The existing McLaughlin library air handling units that serve the area covered under phases 1 to 3 do not have sufficient capacity to extend their coverage into the new extension and the best option is to provide a new air conditioning system for this new zone. Mechanical space will be required for a new air handling unit, ductwork riser and it is recommended that an overhead VAV system be installed within this new space on each floor. Installing a VAV system not only gives a good level of control and energy efficiency but within the new extension this type of system will allow the upper floors to be shut down and allow the ground floor to remain operational if the new ground floor space is required to be used to access the 24 hour space.

5.4 Building management controls
It would not be recommended to extend the existing pneumatic controls system intro the phase 4 new extension rather it would be advisable to install a new dedicated electronic controller to control the air conditioning and perimeter heating. This can easily be tied into the existing building management system to ensure that harmonious control is achieved in both the existing and new sections of the McLaughlin library and to ensure that one zone does not fight against the other zone.

5.5 Plumbing
Domestic Hot & cold water
Phase 4 has no requirements for any domestic hot or cold water.
5.6 Drainage

Storm water
A new storm water system will be required to serve the new extension roof area. A new pipework riser will be required and it should be run down to the ground floor and then tied into the existing storm drain system at the connection point extended and left for this purpose in the earlier phases.

Sanitary Drainage
Phase 4 has no requirements for any sanitary drainage services.

5.7 Fire Protection

As noted previously the existing McLaughlin Library building is served by a standpipe system and fire hose cabinets only and does not have any sprinkler coverage.

The requirement for sprinklering the phase 4 extension building will be linked to the requirements of the existing McLaughlin library building and again a code consultant should be consulted for final review of this requirement but it is highly likely that a sprinkler system will be required.

All of the backbone sprinkler system in phases 1 to 3 should have been installed by this point and the new sprinkler system for the existing library building space should be design with the assumption that the extension is going to be built with either capped sprinkler connections left on each floor for future tie in or a separate sprinkler riser is installed to serve each floor when phase 4 is constructed. This would require in phase 1 a single separate sprinkler pipe be installed from the sprinkler room to the ground floor adjacent to the extension building area and capped off for this future extension.
6  ELECTRICAL:

6.1 Existing Main High Voltage Services to the Campus

The main service to the University Campus is located in the Generator Building (Bldg. #56). This service is supplied from Guelph Hydro at 13.8kV by three (3) incoming feeders connected to a twenty-four (24) cell switchgear.

6.2 Existing Service to McLaughlin Library (Building #71)

The Electrical Supply for the McLaughlin Library, originate from cells 21 and 22 of the main incoming 13.8kV service to the campus, by a 13.8kV service to the campus, by a 13.8kV loop configuration. This loop serves the McLaughlin Library and several other buildings.

The existing 13.8kV switchgear in the McLaughlin Library was installed in the 1960’s. Though aged, this equipment is in generally good condition and there is no known history of problems with it. It appears to be well maintained on a regular basis, and infra-red testing is an integral part of the maintenance process.

We would therefore suggest that the existing 13.8kV switchgear assembly be maintained.

The McLaughlin library 13.8kV Services has two (2) closed-coupled Transformers:

a) 1000kVA, 13.8kV – 208/120V
b) 750kVA, 13.8kV – 600/347V

Both of these transformers were replaced approximately five (5) years ago, to make them PCB compliant, are in good condition and we recommend they be maintained.

Although we do not have information regarding the electrical demand loads on the existing library, we can confidently assume that there is adequate capacity in the existing power transformers to accommodate the proposed building addition.

6.3 Distribution

All of the existing secondary distribution from the main secondary switchboards to the branch circuit panelboards on the floors is all original equipment, dating from the mid 1960’s.

We would suggest that all this equipment has reached the end of its normal life cycle and it would be our recommendation that, as part of the proposed renovation and addition, all the existing distribution equipment should be replaced with new equipment.

The existing distribution within the library is organized into four (4) quadrants for each floor plate and each quadrant has a dedicated electrical closet/room. We suggest that this present distribution structure be maintained as part of the refurbishment as it is efficient in terms of the electrical distribution and will minimize the area of the building being disrupted while the panel replacement is underway.

We would anticipate that the bulk of the branch circuit wiring from the on floor panelboards will be a conduit and wire system run through the ceiling space. However, there is an existing in-floor raceway...
system that could potentially be utilized to distribute power to workstations or consoles which may be located in the open floor areas.

6.4 Emergency Power

Emergency power for the campus is generated centrally and subfed to the McLaughlin Building.

As with the normal power distribution the panelboards served by the emergency supply are original and we would recommend replacement of the panelboards.

To accommodate the renovation and the new layouts, we anticipate all new branch circuit wiring will be provided for the branch circuit panel boards on each floor.

This new wiring will support both life safety loads such as the fire alarm system, emergency and exit lights and the essential but non-life safety equipment such as the security system and any other equipment deemed essential by the University.

There are two (2) other concerns that will need to be considered with respect to the emergency distribution system.

The first is the potential addition of sprinklers to the building. If the building is to be sprinklered, it may require the addition of a fire pump. This will be added load on to the existing services and will also require a dedicated distribution supply.

The second is that the building is supported by a single transfer switch. Present codes require that all life safety systems be on a single dedicated transfer switch while other essential, but non-life safety systems, be on a separate dedicated transfer switch. There may be very little essential, but non-life safety loads, to be considered in the library but this should be reviewed in detail before the reorganization of the emergency distribution is started.

6.5 Fire Alarm

The building has a relatively new fire alarm system which was installed in 2003.

It is a single stage Notifer NFS-640 system.

We suggest that although the main control panel and annunciator are in good condition and we recommend to retain them, there will be substantial refit needed of both the initiating and signalling device layout on the floors of the library.

The mechanical portion of the report has suggested the possibility of the building being sprinklered as part of the renovation and this decision will have a significant impact on the extent of the coverage required for the initiating devices required.

Initiating devices will comprise pull stations, heat detectors, smoke detectors and duct smoke detectors all provided and located as required by the Ontario Building Code.

Combination audible and visual signalling devices shall be provided throughout the space.

6.6 Lighting

We would anticipate that all new lighting will be required throughout the facility to accommodate the renovation and addition.
With the rapid advancement in LED technology and LED lamp based lighting fixtures, we suggest that there will be an intensive review of the use of LED and/or high efficiency fluorescent lighting as the primary source of lighting in the building.

The development of the lighting concepts for the library will be a very integrated process between the client, the architect and the electrical engineer / lighting designer.

Lighting of the renovated library will be a significant component in the successful renovation of the space.

6.7 Lighting Control

We propose that a new low voltage (LV) lighting control system be provided.

This system will be provided with occupancy sensors, and daylighting sensors and local switches. These devices will be provided and located both to meet the latest requirements of ASHRAE 90.1 and also to facilitate the safe and easy operation of the lighting in the different building spaces.

Master command control functions can also be programmed with the system to ensure all lighting is switched off after hours to minimize the library energy consumption.

6.8 Security Systems

A new card access and intrusion alarm system will be provided for the library. This controlled access will also entail controlled access to the 6th floor of the library.

6.9 Telephone & Data Communication System

We anticipate that all new telephone and data communication systems will be provided throughout the library.

The extent of the system, probably incorporating the use of the WIFI antenna throughout, will be discussed with the University.

6.10 Phasing Of The Work

The majority of the work on the floors of the building will be undertaken as part of the individual construction phases.

The items which may need to be considered being undertaken outside of the individual floor construction is the normal power and emergency power infrastructure upgrade. Some of the work related to this infrastructure upgrade within the existing building may need to be undertaken prior to the work on the individual floors.

We anticipate that Phase 2 will have a stand-alone normal & emergency power distribution system connected back to the building main switchboards. Systems such as fire alarm and lighting control will be connected into the Phase 1 system to operate as a single cohesive system.