

**Report of the Project Planning Committee for the
University of Toronto Libraries
High-Density Library Storage Facility Expansion
at the Downsview Campus**

April 3, 2013

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I. Executive Summary

Completed in 2005, the University of Toronto Libraries (UTL) High-Density Library Storage Facility at the Downsview Campus has proven to be a successful means of addressing the University's increasing collection storage requirements. Low-use materials from all U of T libraries are transferred weekly, and access to the entire collections is provided by an online request service supported by a daily courier with retrieval within 24 hours..

The design of the facility (by University of Toronto's Design & Engineering group) and its operational program was based on that of facilities already in place at institutions such as Harvard, Yale, and Ohio State Universities, as well as several other universities with large research libraries, located in similar climates.

It is considered an "exceptional facility" by the Ontario Council of Universities Libraries. The high-density storage system uses an industrial racking system with shelves that are deeper and wider than those in typical library units. As well, instead of books being individually placed on shelves, volumes of the same size are grouped together and placed in open trays. The volumes are encoded with a scannable UPC bar code as well as each box/tray, shelf and rack. With suitable hardware and software to identify, store, locate and retrieve individual items, the collection is stored without concern as to subject matter or author.

The 2005 UTL Downsview project represented the first two-bay module of an expandable model and currently accommodates up to 2,200,000 volumes. While the temperature and humidity controlled building is considered a model facility amongst peer institutions, it will soon be approaching its existing capacity (total volumes as of October 30, 2012 is 1,980,000).

Current projections foresee that the UTL's existing High-Density Storage Facility will be full by December, 2013; consequently there is an urgent need to increase the facility's capacity in the immediate future.

Based on the original facility's project design, it is anticipated that a one module expansion of two bays would be the most economical means of presently fulfilling the UTL's pressing collection storage needs. This corresponds to an expansion that would be approximately 1,288 nasm (1,670 gsm).

Every effort must be made during the construction process to not interfere with the activities of other groups at the Downsview site, including the UTIAS facility directly adjacent and the U of T Press facility at the Dufferin Street site entrance. The Environment Canada facility at 4905 Dufferin Street also shares usage of the upper portion of the main site driveway (via an access easement).

It is anticipated that full operational occupancy will be achieved by March 2014.

II. Project Background

a) Membership

Alfred Cheng, CAO, University of Toronto Libraries

George Phelps, Director, Project Development

Gail Milgrom, Director, Campus & Facilities Planning

Alan Webb, Planning Officer, Campus & Facilities Planning

b) Terms of Reference

1. Identify the current and long-term storage requirements for the storage of library material, primarily books, of the University of Toronto Library system. Identify the frequency of use of this facility.
2. Make recommendations for a detailed space program and functional layout to accommodate the proposed addition to High-Density Library Storage Facility at Downsview Campus.
3. Demonstrate that the proposed space program will take into account the Council of Ontario Universities' (COU) space standards and University's own best practice guidelines.
4. Determine the secondary effects of the project, including any necessary space reallocation.
5. Review the capacity of existing site services and infrastructure and determine the extent of upgrades, if required.
6. Identify any new equipment and moveable furnishings necessary to the project and their related costs.
7. Establish an implementation schedule for the proposed project.
8. Determine a total project cost (TPC) estimate for the capital project, including costs associated with secondary effects.
9. Identify all sources of funding for the capital project and increased operating costs once the project is complete.
10. Report by March 8, 2013.

c) Background Information

Completed in 2005, the University of Toronto Libraries' (UTL) High-Density Library Storage Facility at the Downsview Campus has proven to be a successful means of addressing the University's increasing collection storage requirements. Low-use materials from all U of T libraries are transferred weekly, and access to the entire collection is provided by an online request service supported by a daily courier.

The design of the facility (by University of Toronto's Design & Engineering group), and its operational program, was based on that of facilities already in place at institutions such as Harvard, Yale, and Ohio State universities, as well as several other universities with large research libraries. Following extensive review of UTL's projected space requirements, this modular expansion model was found to be the most effective means of addressing UTL's steadily increasing collection (approximately 155,000 volumes annually). Each bay allows for 1,000,000 volumes of capacity. A site capacity of at least 5,000,000 volumes is anticipated being required to satisfy the UTL's storage needs to the year 2020.

The 2005 UTL Downsview project represented the first two-bay module of an expandable model and currently accommodates up to 2,200,000 volumes. While the temperature and humidity controlled building is considered a model facility amongst peer institutions, it will soon be approaching its existing capacity (total volumes as of October 30, 2012 is 1,980,000). Current projections foresee that the UTL's existing High-Density Storage Facility will be full by December, 2013; consequently there is an urgent need to increase the facility's capacity in the immediate future.

Based on the original facility's project plans, it is anticipated that a two-bay expansion would be the most economical means of presently fulfilling the UTL's pressing collection storage needs. A third bay may be constructed as part of a future project in order to meet UTL's 2020 needs.

d) Statement of Academic Plan

Over many decades, the University's significant investment in collections and services has resulted in one of the world's great research libraries.

UTL at Downsview (UTLD), the libraries' high-density storage and preservation facility, was opened in 2005 with the objective of housing important but lesser used research materials in order to re-purpose library spaces for study and collaboration, and to improve the shelving of, and access to high-use materials in Robarts Library. To date, lesser used collections from the following U of T libraries have been transferred into the initial two bays: Robarts, Gerstein, Engineering & Computer Science, East Asian, OISE, Dentistry, Earth Sciences, Mathematics, Faculty of Information, Law, Architecture, Music, Physics, Chemistry, New College, Knox College, Criminology, UTSC, and UTM. In addition, archival materials from the Libraries' media collections, as well as from the University Archives, and the new Canadian imprints collected by the Thomas Fisher Rare Book Library are being stored.

Users have access to the UTLD collections through an online request service and requests for both circulating and archival collections are filled within 24 hours. Access to high-use collections, now that there is room to shelve them in the campus libraries, has been enhanced. Study spaces were restored and expanded in many libraries, including Robarts, Engineering and Computer Science and Gerstein Science Information Centre. In many other libraries, access to collections has been significantly improved, as there is now space to house new acquisitions.

e) Existing Facility

The existing facility of 1,672 nasm (2,008 gsm) includes a processing-administration facility of 385 nasm and high density storage area comprising two structural bays at 1,287 total nasm that currently accommodates up to 2,200,000 volumes.

Existing Space Inventory

Rm	Cat.	Category	Description	Share	%	Area
130	05.1	Collection	Book Storage	Space	88	1,287
						1,287
112	05.2	Office	Supp Admin Office Single	None	100	10
114	05.2	Office	Supp Admin Office Single	None	100	10
						21
100	05.3	Support	Staff Lounge	None	100	10
103	05.3	Support	Reading Room	None	100	18
110	05.3	Support	Library Processing Room	Space	85	189
120	05.3	Support	Shipping and Receiving	None	100	119
122	05.3	Support	Receiving Area - Van Bay	None	100	28
						364
				Grand Total		1,672 nasm

There are no anticipated changes to the current staffing of three full-time High Density Shelving and Retrieval Associates, one full-time Manager and additional flexible student staff when required

III. Project Description

a) Space Program and Functional Plan

Operation

The high-density storage system in use at UTL Downsview uses an industrial racking system with shelves that are deeper and wider than those in typical library units. As well, instead of books being individually placed on shelves, volumes of the same size are grouped together and placed in open trays.

The volumes are encoded with a scannable UPC bar code as well as each box/tray, shelf and rack. With suitable hardware and software to identify, store, locate and retrieve individual items, the collection is stored without concern as to subject matter or author. When grouped by size, boxes or trays are placed on end into shelves (with usually two boxes or trays end-to-end on a 36-inch deep shelf), the available 'storage' volume of the rack is optimized.

The on-going operation is not only expected to process new, incoming items to the facility but also to retrieve, copy or scan, for physical or electronic delivery, and re-shelve material already in the storage collection, as it is requested. A 24 hour turnaround time is the norm.

Storage Bays

A complicated space program for each of the storage bays is not required. The basis of the design criteria for each bay is to provide the minimum structure to envelop the long-term storage collection in an environment that is appropriate for the preservation of library material.

Each bay is programmed to accommodate approximately one million volumes (of predominantly print material) within a building environment of 12-20°C (+/- 2°C) and 40% RH (+/- 10%). The maintenance of a constant environment is crucial in the preservation of print material.

The storage strategy of the existing facility is to be followed for the expansion:

- Each range of racking is 30 ft high, with 30 bays per range at 25 shelves per bay
- Each structural bay accommodates 8 ranges
- Total number of shelves per structural bay = 6,000

The new expansion will constitute an enclosed building envelope with a single oversized door opening capable of forklift passage between the existing storage area and the expansion (see Test Fit Floorplan Diagram).

Space Program

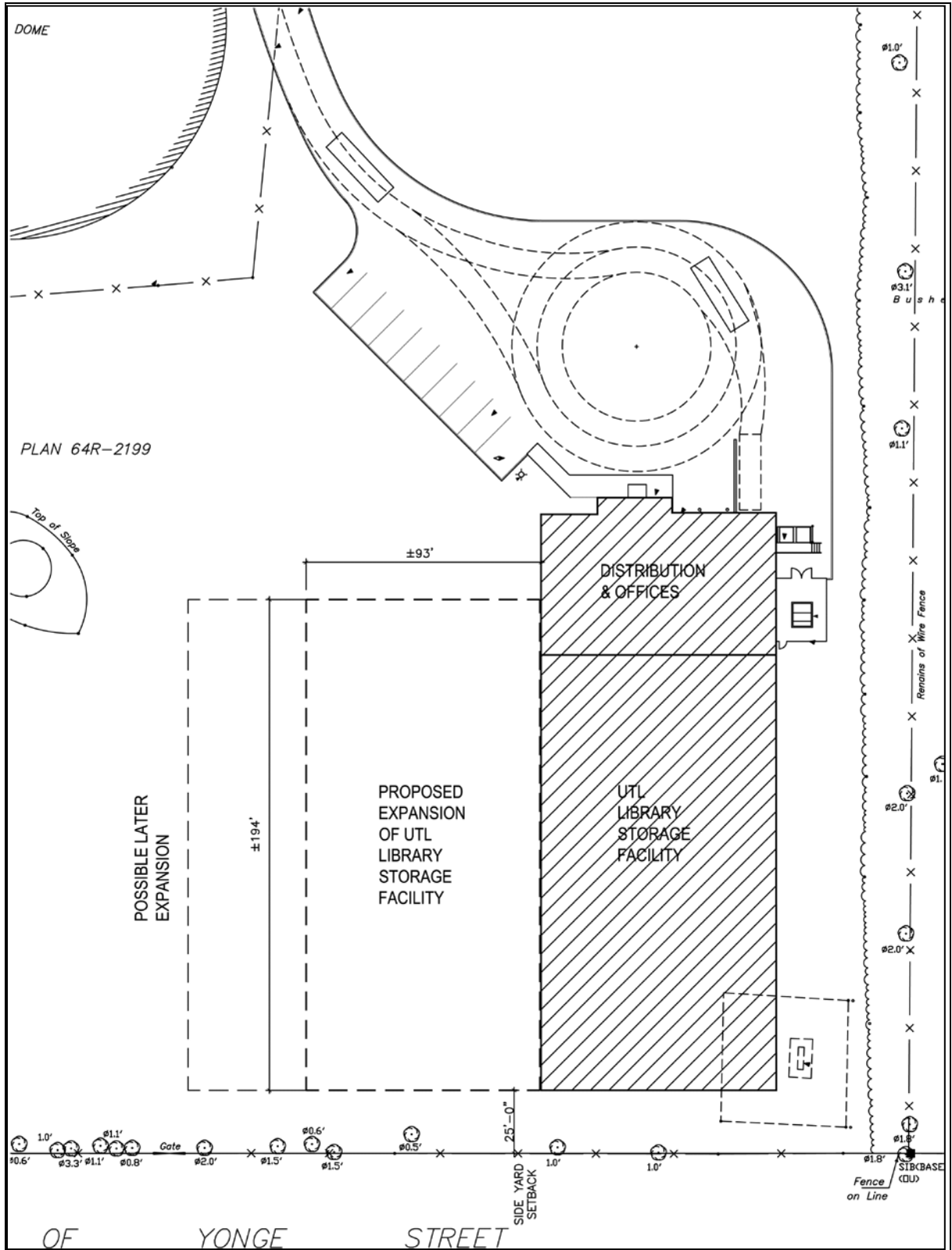
The following is an approximate projection of the assignable area required to accommodate the two proposed new bays of storage of the expansion. It is not anticipated that additional non-assignable spaces (besides circulation) will be required as part of the expansion.

Usage	Capacity (volumes) Per Bay	Area Per Bay (nasm)	# Bays	Total # Volumes	Total (nasm)
High Density Storage Rack Area	1,000,000	644	2	2,000,000	1,288

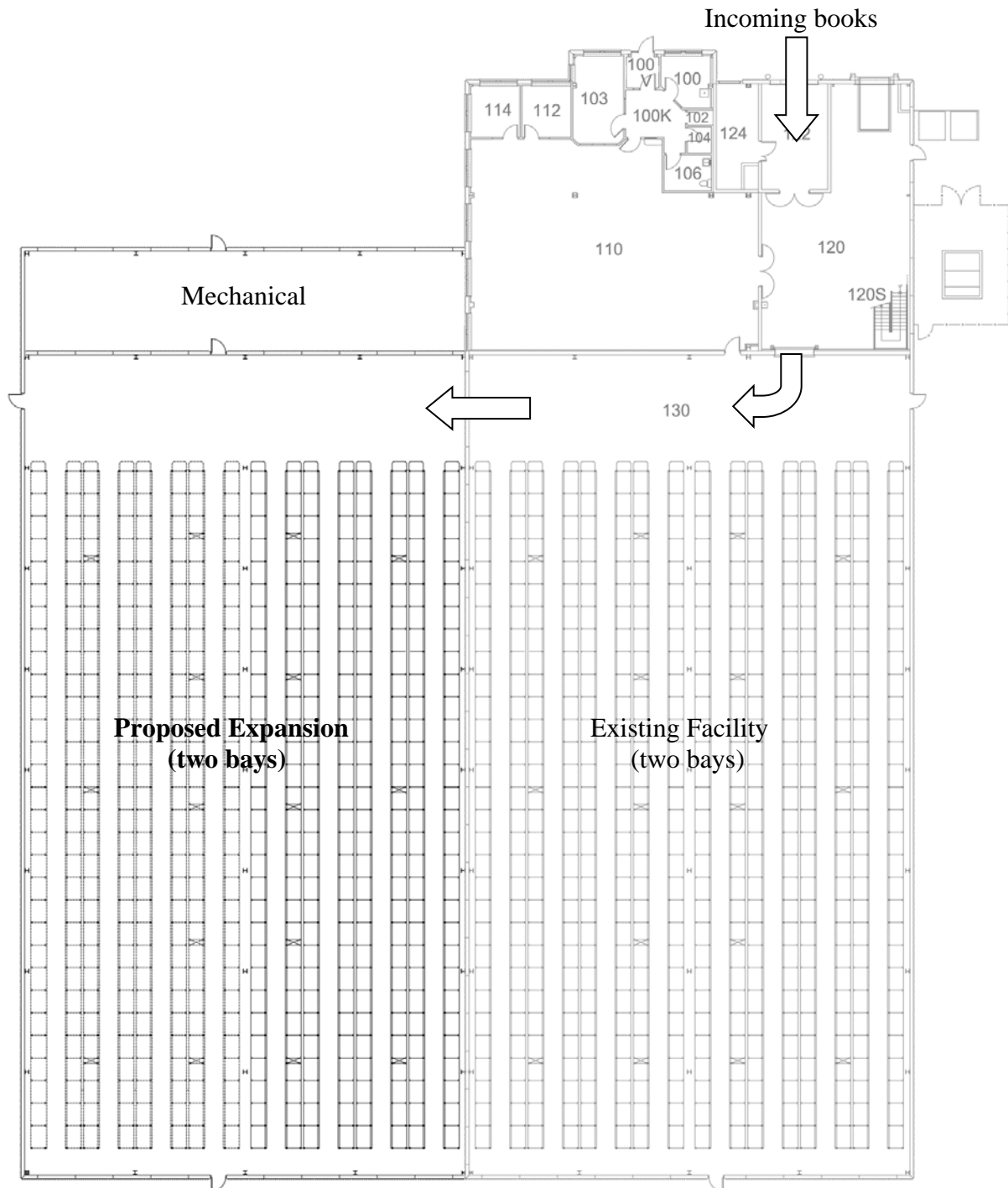
COU guidelines for offsite compact library storage (within Category 5.1) recommend a space factor of 0.0035 nasm per equivalent volume (286 volumes per sq.m.), whereas the high-density racking system at Downsview has a space factor of .000644 (1552 volumes per square meter). This is recognized by the Ontario Council of University Libraries as being exceptional.

Based on the design of the existing facilities, it is anticipated that the gross area required for a two bay expansion would be approximately 1,670 gsm (including mechanical space).

Site Plan Diagram



Test Fit Floorplan Diagram



The test fit diagram above shows an expansion based on the width of the existing structural bays - for this project, an expansion of two bays are shown. Note: this diagram represents a 'test fit' for planning reference only and does not indicate a final design.

b) **Building Considerations**

The expansion of the storage facility must be designed to the same standard as the original building (i.e. designed to avoid or resist 100 year floods, earthquakes, hurricanes etc.).

Conceptually, it consists of two high density storage bays forming a single building envelope that shares a wall with the existing facility and having a nominal capacity of one million volumes each (two million total). This volume requirement translates into storage bays of approximately 74 feet deep by 144 feet wide in interior dimensions with at least 31 feet clear height inside. The precise interior dimensions will depend on the final configuration of racking (to match existing shelf system) and exterior envelope (to match existing construction).

As with the original building, the expansion will need to be secure, well lit, with multi-level sprinkler protection, and HVAC systems capable of maintaining a 12-20° C (+/- 2°C) and 40% RH (+/- 10%) year round for 95% of the year in the Toronto climate. The expansion will have its own HVAC system. The fire protection system must be integrated with the existing facility.

The standards of the existing facility are to be followed for the expansion and include:

- Exterior cladding of pre-cast concrete
- "Super-flat" floor construction in the storage area
- Level of lighting in the storage area is 5 foot candles
- HVAC system for the storage area is designed to hold the temperature within a 2 degree range and humidity with a 2% range of optimum environment for long-term storage of print materials
- An air curtain and double doors between the dock and the storage area help to control the climate

Any additional voice/data communications in the expanded storage area will need to be integrated with the existing data infrastructure already in place at the facility.

A review of the existing facility conditions must be conducted as part of the due diligence of the design development process, including: any deferred maintenance issues, code and environmental requirements, environmental health and safety. Given that the original facility was completed in 2005, no major issues are anticipated.

Hazardous materials

Because the existing portion of the facility was constructed relatively recently, no hazardous materials are anticipated.

Site services

No issues with sanitary sewage have been identified but this should be confirmed with the design consultant. Storm water should be drained locally. The water main has already been upgraded so no issues are anticipated with domestic water or fire systems supplies.

Landscaping

A number of trees planted at the time of the first UTL phase have died because of lack of watering. It is recommended that irrigation be added to the scope of the project to prevent a continuation of this trend.

Design standards

The project must be designed and constructed in accordance with the University of Toronto St. George Campus Design Standards and the relevant update bulletins. Current editions of the standards and bulletins can be found at <http://www.fs.utoronto.ca/aboutus/design.htm>

Heating, ventilation and air conditioning

While there have been no serious issues with the systems installed in the existing UTL facility, it is recommended that the new phase include a Building Automation System that can be monitored remotely from the downtown campus.

Electrical power supply

Based on the existing capacities of the local transformer (1,000kVA) and main switchboard (600v) and the estimated demand load for the new storage area, there appears to be sufficient capacity for the new storage from the local service. There are spaces in the existing 600V switchboard for new breakers of adequate rating to be installed to feed the new storage area. However, the design team working on the project must confirm with Toronto Hydro to ensure that the incoming supply is adequate for this additional load (i.e. feeder size, fuse rating), since Toronto Hydro only allowed for the loads of the UTIAS main building and the first phase of the UTL facility in 2005. The recently completed MTSC project at UTIAS along with the new storage planned for UTL may necessitate some upgrade of the incoming service to accommodate the additional loads.

Sub-metering of UTL's 600V switchboard is recommended so that the loading of the local transformer can be monitored remotely.

Accessibility

As with the existing building, the expansion is not intended for general faculty, student or public access; it will strictly be used for the secure, long-term storage of the library's low use material. Although the expansion will be designed and constructed to meet all applicable building regulations and the administration/processing facility will be accessible, it is accepted that the storage bays will only be accessible by able-bodied personnel. The height of shelves in the racking system will require the use of "man-aboard" lift-trucks and the depth of shelves will require staff who can readily and safely retrieve book trays.

Sustainability

As this project constitutes an addition to the existing non-LEED certified facility, it is not anticipated that LEED certification would be a feasible option. Regardless of this, every effort should be made during the design process to produce an energy efficient, sustainable facility that will minimize operating costs and mitigate its impact on the surrounding

environment. Following completion of the expansion, the feasibility of LEED for Existing Buildings: Operations & Maintenance (EBOM) may be explored.

c) Site Considerations

The Downsview Campus has proven to be an excellent location for the long-term storage facility as it is centrally located to the St. George, UTM and UTSC Campuses, has existing capacity on site to accommodate expansion, and can be readily accessed by vehicles off of Dufferin Street via the current driveway.

As is standard planning practice, all relevant municipal approvals must be obtained prior to construction. This includes conformance with Toronto Regional Conservation Authority regulations governing the area. Based on the planning undertaken for the original project construction and a preliminary review of the existing zoning bylaws, it is not anticipated that the expansion will require any major variances.

Given that there will be no staffing increase for the facility, a case will be made that no additional parking will be required.

New electrical, water and sanitary service connections were added at the time of the initial UTL Storage Facility construction.

d) Campus Infrastructure Considerations

The existing general site access routes, pathways and fire access will remain. It is not anticipated that any major upgrades to this infrastructure will be required at the municipal approvals level.

e) Secondary Effects

Every effort must be made during the construction process to not interfere with the activities of other groups at the Downsview site, including the UTIAS facility directly adjacent and the U of T Press facility at the Dufferin Street site entrance. The Environment Canada facility at 4905 Dufferin Street also shares usage of the upper portion of the main site driveway (via an access easement).

The Institute for Aerospace Studies performs high level research using extremely sensitive equipment. Planning for the construction of the new UTL facility must take the following concerns into consideration:

- All experimental labs use lasers. These lasers are very sensitive to vibration which could result in unconfirmed data post experiments.
- The Dome: External companies contract the University for use of the Dome to run experiments. A timetable of experiments can be provided by UTIAS upon request so that disruptive work can be coordinated around experiments.
- Water Channel lab: This lab is located at the southernmost portion of the UTIAS building and is the most sensitive to vibration. Again, a timetable of experiments can be provided by UTIAS upon request so that disruptive work can be coordinated around experiments.

- o Site access during construction must be carefully planned so that fire routes are not blocked, pedestrian thoroughfares to the sports field and other destinations are not compromised and truck traffic controlled. Any use of existing asphalt driveways and parking areas for heavy vehicular traffic would necessitate replacement of the surface at the end of construction activities. This must be discussed with UTIAS before construction begins.

It should be noted that there are plans for an upcoming renovation to the UTIAS facility to construct a new fuel propulsion laboratory. The specific timing and location of this lab is still to be determined however UTL and UTIAS will monitor its implementation and any impacts on construction.

Construction should also be staged such that the ongoing storage activities in the existing UTL facility are not adversely affected. This includes provisions to minimize any disturbances (dust, etc.) to the strict existing UTL interior environmental parameters.

f) Schedule

Current projections foresee that the UTL’s existing High-Density Storage Facility will be full by December, 2013; consequently there is an urgent need to increase the facility’s capacity in the immediate future.

Governance Approval	May, 2013
Design Development & Contract Award	June – October, 2013
Tender & Award	December, 2013
Mobilization and Construction	February, 2014
Commissioning and Moving	September, 2014
Full Operational Occupancy	November, 2014

IV. Recommendations

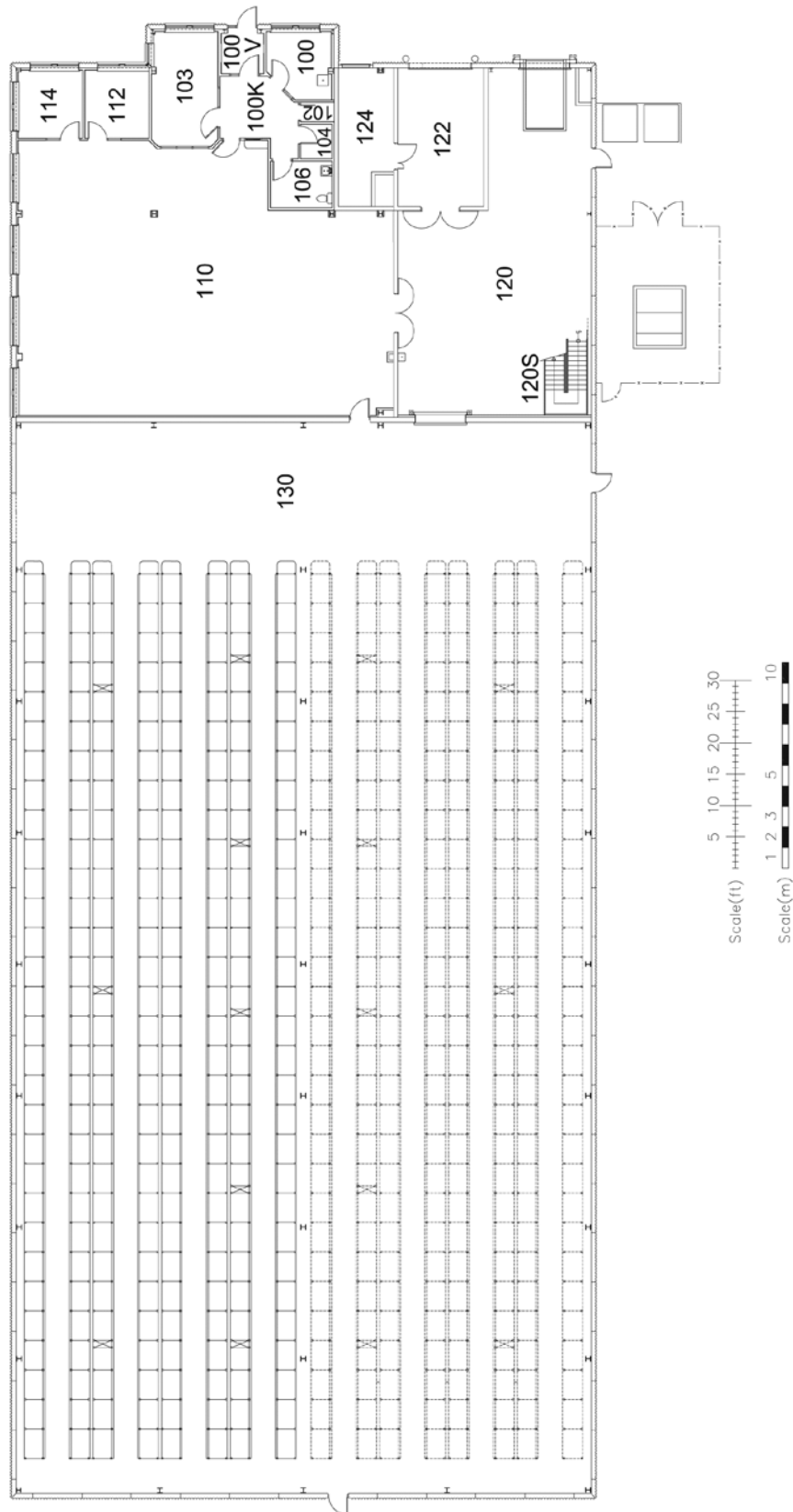
Be It recommended to the Academic Board:

1. THAT the Project Planning Report for the UTL Expansion to Library Storage at the Downsview Campus, dated April 3, 2013 be approved in principle.
2. THAT the project scope to expand the existing high density library storage facility by two bays, or approximately 1,670 gross square metres, be approved in principle, with funding by an allocation from the University’s operating budget.

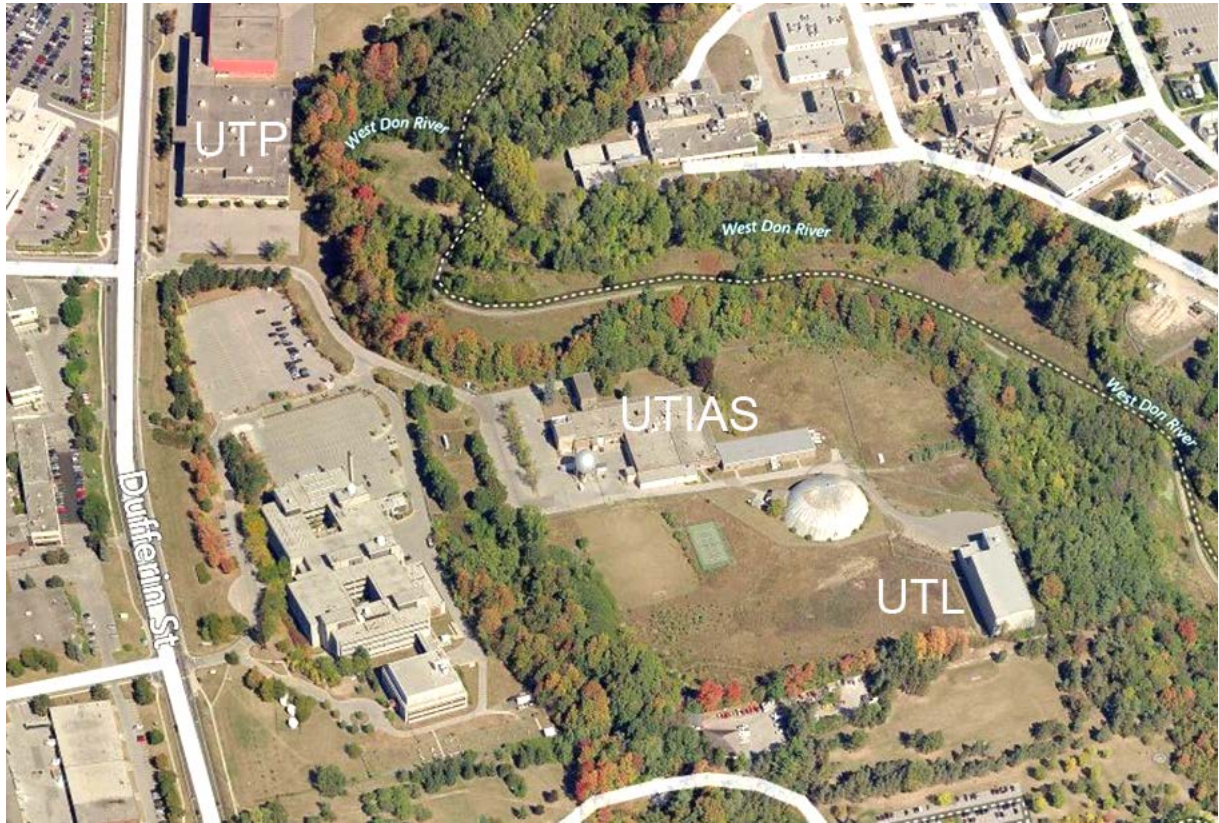
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Appendix 2 - Existing Building Floorplan



Appendix 3 - Existing Site Images



Aerial view of Downsview site showing entrance and driveway from Dufferin Street.