FRAMEWORK

100% DETAILED FUNCTIONAL PROGRAMMING REPORT

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Executive Summary

Under the Federal Science and Technology Infrastructure Initiative (FSTII), the Transportation Safety and Technology Science (TSTS) Hub was formed with a partnership and collaboration of the Transportation Safety Board of Canada's (TSB) Engineering Lab and the National Research Council of Canada's (NRC) Structures and Materials Performance Laboratory (SMPL), a part of the NRC Aerospace Research Centre. The FSTII was renamed Laboratories Canada in 2019.

FRAMEWORK (FW) was retained by Laboratories Canada to provide technical support for the two-stage Functional Programming approach for the TSTS Hub. The phases are Phase 1 – Master Programming and Phase 2 – Detailed Functional Programming. The first phase was completed in May 2020. The second phase built on the previous work completed; therefore, this report includes information from the Master Programming phase, as well as new information gathered during the Detailed Functional Programming phase.

In addition to the TSTS Hub scope of work, Phase 2 also incorporated the TSB Head Office (HO) within the programming. Approximately 148 TSB HO staff members have been added to this program and will occupy office space within the TSTS Hub building. Note that Phase 1 had approximately 98 FTE for the TSTS Hub.

The scope of work in this Detailed Functional Programming phase includes:

- Integrating the TSB HO into the Detailed Functional Programming.
- Understanding the TSB HO functional and technical requirements and reviewing the previously completed Functional Programming report.
- Confirming the TSTS Hub's functional and technical requirements for each space.
- Verifying the adjacencies for the high bays, laboratories, workshops, logistics, and laboratory support spaces.
- Developing brown sheets which illustrate the overall spaces required in the building.
- Developing and reviewing technical requirements and documenting these requirements in room data sheets (RDSs).
- Refining the space typologies.
- Completing a review of the outdoor requirements.
- Reviewing the security requirements in the security documentation provided by Laboratories Canada's Security Team. This includes: The Preliminary Security Requirement, Security Space Requirements, Threat and Risk Assessment (TRA) Recommendations and RDS Security Input.
- Analyzing the Government of Canada (GoC) Workplace Fit-Up Standards (GCworkplace) survey results and calculations to forecast office space needs.
- Implementing the Science Office Accommodation space planning to define science-related office accommodations.
- Defining the Public Spaces and the Collaboration Areas for both the TSTS Hub and the TSB HO.
- Analyzing the requirements for environmental sustainability set by Laboratories Canada, including Net Zero Carbon.

A siting options analysis is being completed in parallel to the Detailed Functional Programming. It is a complementary exercise that includes three test fit options for the recommended site, the creation of a 3D massing model, and the development of high-level energy model for each test fit option.

At the time of issuing this 100% Detailed Functional Programming report, the FW team had completed four collaborative workshops in Detailed Functional Programming with Laboratories Canada, TSB HO, and the TSTS Hub. A series of reports were developed and summarized for each workshop, which served to inform this Functional Programming Report.

The functional programming complies with industry standards for science facilities. Program requirements were derived through a series of workshops, questionnaires, reviews of existing spaces, and detailed reviews of equipment and workflows.

Space program requirements were further defined by GCworkplace and the SOA/SoR provided by Laboratories Canada. The program developed is specific to the needs of the TSTS Hub and the TSB HO and establishes the correct area and adjacency requirements for the building and its future occupants. TSB HO office areas are following the GoC GCworkplace Fit–Up Standards. The GCworkplace Workbook is a mandatory tool to assist design professionals to calculate baseline work point quantities (individual, collaborative) and support spaces tailored to each activity profile.

In collaboration with Laboratories Canada, the RLDF FW team has been developing the SOA process to facilitate programming of science office areas. For the TSTS Hub the team utilized a customized SOA calculator and an SOA office and work point typology catalogue for developing the program areas (Refer to **Appendix N**).

One of the Laboratories Canada design principles is Collaboration. The FW team was conscious of the fact that spaces must be multipurpose and can be shared among the TSTS Hub stakeholders. Excluding the TSB HO area, the sharable TSTS space is anticipated to represent 57.8% of the overall science area. Overall 69% of the existing laboratory space required resizing (either by increasing or decreasing existing science areas), 29% of the laboratory space is new, and the TSTS Hub was able to eliminate 2% of existing science areas as they are surplus to their requirements.

Space synergies (i.e., commonalities) were developed to consolidate, share spaces and equipment, and develop a program to minimize the gross building area requirements. This will create a cost-effective infrastructure for scientific research and evaluation. Fourteen space synergies (i.e., shared spaces) are listed in **Table 2.4.** These includes nine shared laboratories, in addition to workshops, logistic spaces, and a new resource centre that was developed during functional programming.

The TSB Engineering Lab and the NRC SMPL each have one distinct high bay area for their respective science-related activities. The activities performed in high bays may be confidential or have security requirements that limit accessibility. These high bays are not intended to be shared in normal operations. However, following the Laboratories Canada principles of flexibility and collaboration, the TSTS team located the high bays adjacently and requested a moveable partition divider that will allow the maximum permissible width and height of the adjoining high-bay floor spaces to be used in the future. Although the area of laboratories increased, the laboratories are consolidated and optimized by science programs.

Through the exercise of functional programming, it is anticipated that 60% of the total area of laboratories will be shared by the NRC SMPL and the TSB Engineering Lab.

Benefits of these shared spaces include improved opportunities for collaboration and shared knowledge, increased surge capacity, optimized use of equipment, and reduced capital and operating costs, operational and workflow efficiencies, and new spaces for science collaboration and knowledge sharing.

In addition to reviewing the developed RDSs and the engineering requirements, FW reviewed and assessed the variances in **net areas** for science spaces between the original Science Statement of Requirements (SSoR), the Master Programming phase and the Detailed Functional Programming phase (66%, 99% and 100%). Note that the net areas for the Functional Programming are based on RDS version dated February 9, 2021 and subsequent discussions with Laboratories Canada, TSTS Hub and TSB HO.

The Detailed Functional Programming phase has quantified the science requirements (RDS), the TSTS Hub Science Office Accommodations (SOA), the TSB HO GCworkplace, the shared client spaces, and the public spaces of the building. The results of the FW team assessment are outlined in the sections below and in the appendices.

A GCworkplace survey was issued to all members of the TSB HO and the TSTS Hub to establish the high-level space needs of the TSB HO and the TSTS Hub. FW used information from additional sources to determine the SPSs and office space requirements for the science office accommodations (SOA) of the TSTS Hub, including the following:

- Workshops
- Questionnaires
- LC's Strategy Document relating to Science Office Accommodations
- GCworkplace standards

The science office accommodation component of the functional program includes offices, open workstations, collaboration rooms, meeting rooms, kitchenettes, and SPSs. The science office accommodations were developed with user group input to verify the space requirements. This program's net area is determined to be 1,118.30 SQM and is understood to be maintained for a baseline comparison.

For TSB HO office areas, the requirements were set by TSB HO Office of the Chair needs, unique SPS spaces required by their operations and the GCworkplace workbook exercise. All these space requirements were provided to FW by TSB HO and Laboratories Canada and were determined to be 1,681.30 SQM.

The Detailed Functional Programming phase provides two options to meet the program's needs, as shown in **Table 0.1**. Baseline option outlines the science needs developed in consultation with the TSTS Hub and TSB HO. Further optimization option includes additional building optimization that could be effective in reducing the building gross area requirement by 672.41 SQM.

The optimization proposed is discussed in **Section 2.3**. The functional programming exercise was able to reduce the building area requirement by 701 SQM to 1,373 SQM from the gross area values from the initial TSTS Hub SSoR and TSB HO SoR (depending on which recommended option is selected). For the SSoR, the size requirement for total building gross area was 19,304 SQM. During functional programming, this amount was able to be reduced to 18,602 SQM for the Baseline Option and 17,930 SQM for the Optimization Option.

Table 0.1: Space Requirements

Space Name	SSoR Gross Area SQM	MPR - FW Forecast Gross Area SQM	66% FPR - FW Forecast Gross Area SQM	100% FPR - FW Forecast Baseline Option Gross Area SQM	100% FPR - FW Forecast Further Optimization Option Gross Area SQM
Sub-Total Science Spaces + Science Support	6,858.00	7,062.00	7,378.20	7,708.66	7,708.66
Sub-Total Non-Science Spaces	1,894.00	1,894.00	1,894.00	1,118.32	1,017.80
Sub-Total Public Spaces and Shared Client Spaces (Science 75%)	1,422.00	1,422.00	1,066.50	867.90	795.15
Building Gross Up Value	*6,925.00*	*5,523.80*	*5,764.82*	*6,133.41*	*6,020.78*
Sub-Total Science Building Size	**17,099.00**	**15,901.80**	**16,103.52**	**15,828.29**	**15,542.39**
Sub-Total TSB HO	2,205.00	-	2,205.00	1,392.00	1,182.00
Sub-Total Public Spaces and Shared Client Spaces (TSB 25%)	-	-	355.50	289.30	265.05
Building Gross Up Value	*-*	*-*	*1,664.33*	*1,092.85*	*940.58*
Sub-Total TSB Building Size	**2,205.00**	**0.00**	**4,224.83**	**2,774.15**	**2,387.63**
Total Building Size	**19,304.00**	**15,901.80**	**20,328.35**	**18,602.43**	**17,930.02**

The outdoor space requirements for the TSTS Hub were not adequately accounted for in the SSoR, as shown in **Table 0.2**. The Master Programming phase focused on the requirements of the building science program only. At the 66%, the 99% and the 100% Functional programming phases, the outdoor requirements (e.g., outdoor storage, loading dock, circulation, fuel storage tanks, and parking needs) were further defined. For the SSoR, the total outdoor space net area requirement was 1,450 SQM. During functional programming, this amount was increased to 11,445 SQM for the Baseline Option and 8,675 SQM for the Optimization Option. Outdoor science requirements are discussed in **Section 7.0**.

Table 0.2: Outdoor Space Requirements

Space Name	SSoR Net Area SQM	MPR - FW Forecast Net Area SQM	66% FPR - FW Forecast Net Area SQM	100% FPR - FW Forecast Baseline Option Net Area SQM	100% FPR - FW Forecast Further Optimization Option Net Area SQM
Sub-Total Science Program Outdoor Requirements	1,450.00	1,685.00	5,790.00	4,530.00	4,210.00
Hard and Soft Landscaping (approximately 10%)	0.00	0.00	1,850.00	1,850.00	1,850.00
Covered Bike Storage (43 bikes)	0.00	0.00	0.00	85.00	85.00
Parking – Reference Section 7.0 & 11.0	0.00	0.00	3,700.00	5,000.00	2,300.00
Sub-Total Outdoor Space	**1,450.00**	**1,685.00**	**11,340.00**	**11,465.00**	**8,445.00**

FW recommends that if further optimization is required that the sciences spaces be maintained as is and form the baseline for the program. Other opportunities for area reduction in support spaces beyond the science programs should be investigated as a first step. If further area reductions are desired for the purposes of budget control or other reasons, and this includes reducing science spaces, then there is a risk that science related functionality may be compromised. FW believes the science space program is appropriately sized and further reductions may negatively impact core activities of the TSTS science program.

For the Optimization Option, several opportunities for area reduction that would help to optimize the programming included the following:

- Reducing the overall office space component on the basis of future flexible work arrangements/increased teleworking.
- Reduce the size of and/or eliminate some functions within the public spaces, such as the lobby, interpretive centre, kitchenettes, archives, and de-centralized resource centre.
- Reduce the size or presence of spaces to support optimal functionality
- Reduce parking requirements.

Space reduction in this Optimization Option would lower costs of construction. Risks include reduced accommodations for full capacity, reduced collaboration, and reduced access to labs and science functions.

Abbreviations

ARC	Aerospace Research Centre
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
AV	Audio Visual
BAS	Building Automation System
CIP	Cast-in-Place
CoE	Centre of Excellence
DAS	Distributed Antenna System
DES	District Energy Systems
DOAS	Dedicated Outdoor Air System
ECCC	Environment and Climate Change Canada
EMCS	Energy Monitoring and Control System
EUI	Energy Use Intensity
EV	Electric Vehicle
FPR	Functional Programming Report
FSTII	Federal Science and Technology Infrastructure Initiative
FTE	Full-time Equivalent (unit of staff)
FW	Framework
GC/GoC	Government of Canada
GF	Grossing Factor
HO	Head Office
HTM	High Temperature Materials
HVAC	Heating, Ventilation, and Air Conditioning
IAQ	Indoor Air Quality
IM / IT	Information Management / Information Technology
ISO	International Organization for Standardization
ISP	Internet Service Provider
ITAR	International Traffic in Arms Regulations
LAN	Local-Area Network
LED	Light Emitting Diode
MEP	Mechanical, Electrical, Plumbing (engineering disciplines)
MPR	Master Programming Report
NBC	National Building Code
NCR	National Capital Region

NDE	Non-Destructive Evaluation
NECB	National Energy Code of Canada for Buildings
NFPA	National Fire and Protection Association
NRC	National Research Council of Canada
NSM	Net Square Metres
OEM	Original Equipment Manufacturer
OSC	Overhead Service Carrier
PPE	Personal Protective Equipment
PSPC	Public Services and Procurement Canada
RDS	Room Data Sheet
S&T	Science and Technology
SBDA	Science-based Departments and Agencies
SI	Structural Integrity
SMPL	Structures and Materials Performance Laboratory
SOA	Science Office Accommodations
SPS	Special Purpose Space
SoR	Statement of Requirements (TSB HO)
SQM	Square Metres
SSoR	Science Statement of Requirements (TSTS Hub)
TBD	To Be Determined
TEDI	Thermal Energy Demand Intensity
TRA	Threat and Risk Assessment
TSB	Transportation Safety Board of Canada
TSTS	Transportation Safety and Technology Science
UPS	Uninterruptible Power Supply
VAV	Variable Air Volume
VOC	Volatile Organic Compound
VoIP	Voice Over Internet Protocol
WiFi	Wireless Local Area Network

1.0 PROJECT INTRODUCTION

1.1 PROJECT DESCRIPTION

The Transportation Safety and Technology Science (TSTS) Hub is a partnership between the Transportation Safety Board of Canada's (TSB) Engineering Lab and the National Research Council of Canada's (NRC) Structures and Materials Performance Laboratory (SMPL), a part of the NRC Aerospace Research Centre.

FRAMEWORK (FW) was retained by Laboratories Canada to provide technical support for the two-stage Functional Programming approach for the TSTS Hub. The phases are Phase 1 – Master Programming and Phase 2 – Detailed Functional Programming. The first phase was completed in May 2020. The second phase built on the previous work completed; therefore, this report includes information from the Master Programming phase as well as new information gathered during the Detailed Functional Programming phase.

Phase 1 had 98 full-time equivalent (FTE) for the TSTS Hub. In addition to the TSTS Hub scope of work, Phase 2 also incorporated the TSB Head Office (HO) within the programming. The statement of requirements (SoR) for TSB HO defined a need for 148 TSB staff members. A forecasted growth of 15 staff members has been added to this program and will occupy office space within the TSTS Hub building.

The scope of work in this Detailed Functional Programming phase includes:

- Integrating the TSB HO into the Detailed Functional Programming.
- Understanding the TSB HO functional and technical requirements and reviewing the previously completed Functional Programming report.
- Confirming the TSTS Hub's functional and technical requirements for each space.
- Verifying the adjacencies for the high bays, laboratories, workshops, logistics, and laboratory support spaces.
- Developing brown sheets which illustrate the overall spaces required in the building.
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- Analyzing the GoC Workplace Fit-Up Standards (GCworkplace) survey results and calculations to forecast office space needs.
- Implementing the Science Office Accommodation space planning to define science-related office accommodations.
- Defining the Public Spaces and the Collaboration Areas for both the TSTS Hub and the TSB HO.
- Analyzing the requirements for environmental sustainability set by Laboratories Canada, including Net Zero Carbon.

At the time of issuing this 100% Detailed Functional Programming report, the FW team had completed four (4) collaborative workshops in Detailed Functional Programming with Laboratories Canada, TSB HO, and the TSTS Hub. A series of reports were developed and summarized for each workshop, which served to inform this Functional Programming Report.

1.1.1 BACKGROUND

Under the mandate of Phase 1 – Master Programming, the TSB Engineering Lab and the NRC SMPL identified the following functional science areas:

- High Temperature Materials Research and Development
- Structural Integrity Science
- Non-Destructive Evaluation
- Metallography and Microscopy Analysis
- Extraction and Analysis of Vehicle Data
- Electrical and Electronic System Failure Analysis
- Mechanical System Failure Analysis
- Image Analysis and Simulation

These eight (8) functional science areas were identified to be fitted up with specialized laboratory equipment, technology, and infrastructure to deliver the current program of work and meet the Science Vision.

The Master Programming's consolidation strategy considered synergies between programs that could create opportunities or conflicts that created constraints for sharing spaces (e.g., laboratories, workshops, and equipment) and for conducting work. Resources that cannot be shared because of operational constraints (i.e., maintaining confidentiality with International Traffic in Arms Regulations (ITAR)/controlled goods and ensuring the integrity of evidence until an accident investigation is complete) may result in duplication of space and/or equipment.

The consolidation analysis that FW had undertaken for Laboratories Canada can be broken down into seven phases, as follows:

1. Perform an inventory of all science activities by space.
2. Group all science activities into one of the eight functional science areas.
3. Divide science activities between collaborative and independent working environments.
4. Identify additional spaces required to achieve the Science Vision.
5. Identify additional spaces (e.g., for innovation or science outreach) to capitalize on opportunities.
6. Create preliminary space typology requirements.
7. Finalize requirements during Detailed Functional Programming.

1.2 MEETING THE LABORATORIES CANADA DESIGN OBJECTIVES

Laboratories Canada established seven (7) design objectives to guide decisions on laboratory renewal projects across Canada. Each design objective is contextualized with a statement that further defines the expectation of the standard. Each design objective is defined by qualitative and quantitative characteristics, which are assessed at the program level and at the project level. Throughout the program, these characteristics can be further detailed based on each specific project within the overall laboratory renewal program.

1 – DESIGN EXCELLENCE

Achievement of recognizable and memorable Design Solutions that attract and retain top talent. Solutions reflect sound financial stewardship based on complete life cycle analysis.

Defining Characteristics:

- Visibility of science.
- Create a safe, comfortable, and supportive work environment.
- Connected to the greater community context.
- Sense of place within the built public space.
- Expresses and advances a sustainable vision.

2 – COLLABORATION

Encouragement of interaction – both formal and informal - between scientific program staff by means of design elements and operational opportunities.

Defining Characteristics:

- Visual connectivity across the science programs.
- Design of dual-purpose spaces for unplanned teamwork.
- Encourage creative collisions between science staff through design.
- Incubation space for public/private sector use (horizontal and vertical).
- Space for technology transfer and teaching.

3 – FLEXIBILITY

Ability to quickly and economically transition program and technology.

Defining Characteristics:

- Base-building infrastructure creates an adaptable facility.
- Responsive to emergent and unanticipated scientific needs.
- Flexible-use furniture.
- Ability to re-program with minimal operational impact.
- Modular design of laboratories.

4 – FUNCTIONAL SUITABILITY AND EXPANDABILITY

Spaces well-programmed for intended purpose. Ability to expand key areas of a facility.

Defining Characteristics:

- Achieve clearly defined program for each facility.
- Development of concepts defining functional requirements.
- Alignment of site selection to meet functional suitability.
- Master planned with future expansion in mind.
- Planned ability to expand with minimal operational disruption.

5 – SUSTAINABILITY

Efficient use of energy, water, and material to reduce impact on the environment through better siting, design, construction, operation, and maintenance throughout the building's life cycle.

Defining Characteristics:

- Design for "Net-Zero Carbon" and "Net-Zero Energy Ready" facilities.
- Provide climate-resiliency in facility life cycle design.
- Meet specific health and wellness goals.
- Design for high performance operations.

6 – UNIVERSAL ACCESSIBILITY

Universal Accessibility allows all individuals to access and use all elements of a space or environment and its amenities.

Defining Characteristics:

- Achieve compliance with Laboratories Canada accessibility requirements.
- Inclusive design process.
- Equitable and universal accessibility.
- Workplace access for all qualified staff.

7 – INTELLIGENT BUILDING INFRASTRUCTURE

Implement a holistic building automation strategy based on life cycle evaluation, building data management, predictive building operations/maintenance, and a sustainable approach to improve building performance and facilitate occupant productivity, comfort, and safety.

Defining Characteristics:

- Plan and design for intelligent and integrated building management systems (IBMS).
- Plan for future trends in controls and network infrastructure.
- Implement advanced system concepts such as advanced analytics and autonomous actions to provide a safe, healthy, and comfortable environment with optimized performance.

1.2.1 RISKS OR CHALLENGES TO MEETING DESIGN OBJECTIVES

In support of Laboratories Canada design objectives, it is recommended that a score card be developed that can be used as a tool to measure compliance of the design in relation to the 7 design objectives of Labs Canada as described in section 1.2. This tool should be used to monitor and inform the design progression at all key project milestones from concept design through to construction completion. The functional program has considered the 7 design objectives in formulating the size and types of spaces in the program, the functional relationships between spaces, and the concepts of neighbourhoods that are intended to influence future design work.

As design concepts are developed, each should be evaluated based on the key defining characteristics and how successful the concept is at achieving any of the objectives. The level of success can be evaluated based on the scoring totals of each objective. There will be risks and challenges for any project moving forward in achieving the design objectives because the functional program defines idealized space sizes, space types and relationships between spaces, that are targets to strive for, but itself is not the design. The functional program is aspirational and unconstrained. The indicative designs developed as part of the room data sheets are also idealized plan layouts that are not constrained by things such as site size and shape, location, design team architectural concepts, construction quality and other factors that can influence projects. As part of subsequent objectives, FW has been asked to develop test-fit planning studies of this functional program for a specific site. At this time, FW is developing the project scorecard in conjunction with the TSTS Hub and TSB HO to evaluate the test-fit plans in relation to Labs Canada’s seven (7) design objectives. A similar score card can be developed by the construction team to carry forward the goals from design to construction and into the building’s operational management.

Other items that will influence the success of the program that are potential project success risks are:

- **Cost planning:** An inherent goal at the onset of a project is to be “on schedule and on budget”. Successful project delivery involves effective and strategic planning, preparation, and the right people and tools (both internally and externally). Should cost control measures become an issue, navigating the design objectives in a cost-effective manner will be required.
- **Communications and timely decision-making:** Effective external and internal communication is a key element to any project’s success.
- **Design quality:** The ultimate built product will be defined by the design vision developed to address the aspirations of Labs Canada 7 design objectives, how the spaces defined in the functional program are designed and the quality of construction documents. Any of these elements not delivered with excellence can be a risk to the project.
- **Construction quality:** The final built product is the most tangible and measurable outcome of the design and construction process when it comes to evaluating project success. Poor construction quality or incorrect construction delivery methodology can be a significant project risk.
- **Schedule management:** Schedule control is part of the daily routine of any work. Issues that could complicate the project’s scope will be attended to immediately to prevent impediment of progress. The primary objective of all project scheduling is to plan a project’s completion in the most efficient manner, on or before a required date, without sacrificing the cost or quality of the project.
- **Existing constraints of the proposed site and site infrastructure:** The TSTS Hub and TSB HO will be located at the NRC Campus at 1200 Montreal Road, Ottawa. The configuration of the proposed site at the NRC Montreal Road Campus will determine its suitability for the new TSTS

Hub and TSB HO facility. Most of the program rooms must be at grade and large trucks must be able to access the facility. A test-fit exercise will therefore be completed to validate and verify if the proposed site is suitable. This test-fit exercise to be completed in parallel with this phase of work under TA 2.4.3.

1.2.2 TSTS HUB

The TSTS Hub was formed under Phase 1 of the Federal Science and Technology Infrastructure Initiative (FSTII), in partnership and collaboration with the TSB Engineering Lab and the NRC SMPL. The FSTII was renamed Laboratories Canada in 2019. The TSTS Hub will advance the Government of Canada's (GoC's) Science Vision to promote scientific excellence by creating a national TSTS Centre of Excellence (CoE). The TSTS CoE will address current safety issues and design requirements to mitigate future safety risks for Canadians. The TSTS CoE help develop the next generation of transportation safety and science subject matter experts by co-locating TSTS Hub scientists, engineers, and technologists to facilitate collaboration, and by creating partnerships with academia and industry. The TSTS CoE will support evidence-based decision-making. It will allow federal science institutions to collaborate on the sciences and technologies associated with the design, development, and integrity of transportation systems (i.e., air, land, and sea) in addition to the safety certification, accident investigations, and sustainment and life extension of transportation platforms. It will promote a cohesive and consolidated approach to partnering while enhancing Canada's participation in national and international networks to facilitate knowledge and innovation sharing.

In addition to fostering collaborative science, Laboratories Canada is leading the shift to a whole-of-government approach as it relates to the science and technology (S&T) fixed asset class. This approach includes four (4) interdependent components that will enhance federal S&T capacity, address infrastructure deficiencies, and enable collaboration and cutting-edge science by:

- Building new multi-department, multi-purpose "green" federal laboratories.
- Upgrading S&T information management and information technology (IM/IT) systems to facilitate data-sharing and high-capacity computing while ensuring security of government systems.
- Optimizing the impact of investments by sharing the cost of acquiring major scientific equipment.
- Reducing policy barriers that inhibit scientific collaboration.

The types of spaces and their planned areas in square metres (SQM) were approved in the 2018 Memorandum to Cabinet submission. Since then, additional information has been gathered and a characterization of the current TSB and NRC SMPL office and laboratory space was undertaken. The current facilities do not support the science, consolidation, or expected future expansion requirements of the TSTS Hub. As the project proceeds, these requirements will continuously be analyzed, validated, and integrated to consider science excellence, the spaces defined by GCworkplace, and the science office accommodation standards, sharing, processes, and workflows for the TSTS Hub.

Both organizations in the TSTS Hub conduct transportation system engineering and scientific analyses, with different but complementary mandates that focus on improving transportation safety. In many cases, this work is performed by staff possessing similar scientific and technical backgrounds and using similar laboratory equipment for their day-to-day activities. There is an opportunity to strengthen collaborations and partnerships by co-locating these two organizations. This will allow the TSB Engineering Lab scientists to stay abreast of the latest research and technology developments relevant to transportation systems from their NRC SMPL colleagues and allow the NRC SMPL scientists to build upon TSB Engineering Lab investigation findings to initiate new research projects that will enhance public safety and resolve practical problems for the transportation industry.

Cross-collaboration in complementary research areas will further reinforce the well-established transportation safety benefits individually provided by these partners. Cross-collaboration benefits include combined talent pools, modernized and shared infrastructure resources, greater operational flexibility, minimized capital investments, and improved response times due to an increased capacity to manage resource surge. Bringing the two partners together in modern facilities will provide scientists, researchers, engineers, and visiting staff a work environment where they can be agile and responsive to shifting science priorities and stay at the cutting edge of research.

The TSTS Hub will focus on enhancing scientific excellence; establishing a new federal culture of open science and knowledge flow; and attracting and retaining a talented, diverse, and inclusive cadre of scientists (including early-career and international scientists) while addressing pressing real property issues in the National Capital Region (NCR).

1.2.3 SCIENCE HUB GROUP

1.2.3.1 Federal Partners

In November 2018, a Memorandum to Cabinet approved $2.8 billion in funding for Phase 1 (2018–2023) of the Laboratories Canada initiative to renew federal science facilities that are in critical condition. Laboratories Canada is guided by six (6) principles: science excellence, collaboration, a diverse and inclusive talent pool, agility and responsiveness, environmental responsibility, and responsible public stewardship.

Renewal of federal science infrastructure is a priority for the GoC. This project is one (1) of twelve (12) projects to be implemented in the first phase of an ambitious plan to rebuild federal laboratories. Key issues are aging infrastructure—some of which urgently requires repair or replacement—and outdated equipment and technical services. Venues for science programs are unable to keep up with global laboratory standards; as a result, new infrastructure is planned to address the poor conditions and functional limitations of existing facilities.

This renewal offers an opportunity to consolidate and integrate similar science activities and specialized spaces in modern facilities to drive collaboration and innovation. World-class science facilities will be designed with improved environmental performance, responsible public stewardship, and the necessary flexibility to allow for peak operational requirements and surge capacity.

Federal science plays a vital role in delivering on the GoC's responsibilities to advance the health, economic well-being, and social well-being of Canadians; to protect the environment; and to build a more innovative and prosperous economy. Federal science provides the evidence used to develop policies, regulations, and standards and to respond to threats and emerging opportunities.

1.2.3.2 Non-Federal Partners

The TSTS Hub will provide greater opportunities for strengthening and expanding collaborations with non-federal partners by building on previously established relationships to create a specialized science ecosystem. Non-federal partners include other government departments (e.g., provincial, and municipal), academia, private sector original equipment manufacturers (OEMs), and international agencies. The TSTS Hub will allow for public participation and science outreach consistent with open science. Opportunities to optimize collaboration were considered throughout the Detailed Functional Programming phase. Over time, it is expected that new partners and collaborators (e.g., academics, other government organizations, industry, and communities) will become involved through various engagement models.

1.2.4 TSB HO

The TSB is an independent agency with the mandate to advance safety in air, marine, pipeline, and rail transportation in Canada by doing the following:

- "*conducting independent investigations, including public enquiries when necessary, into selected transportation occurrences, in order to make findings regarding their causes and contributing factors;*
- *identifying safety deficiencies, as evidenced by transportation occurrences;*
- *making recommendations designed to eliminate or reduce such safety deficiencies; and*
- *reporting publicly on our investigations and findings in relation thereto.*"

(Source: https://www.tsb.gc.ca/eng/qui-about/index.html)

During Workshop 3, the TSB HO reviewed and provided insight into their Integrated Safety Investigation Methodology (ISIM). An overview of how this mandate will be achieved is shown in **Figure 1.1**.

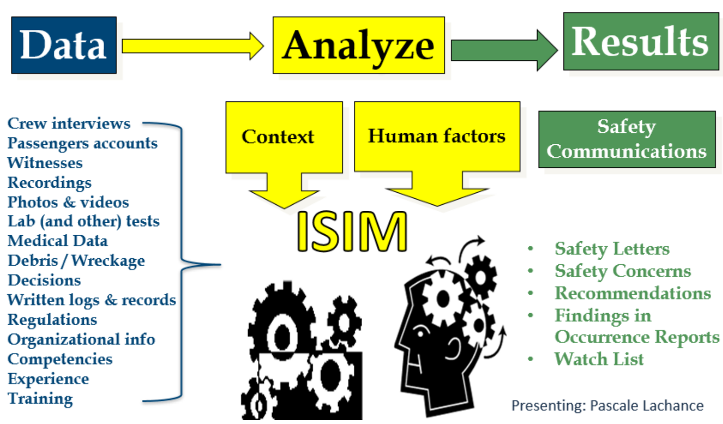


Figure 1.1: TSB HO's Integrated Safety Investigation Methodology

The board of the TSB HO includes five members: a chairperson, a chief operating officer, an executive committee, and support staff with various responsibilities and expertise. The organizational structure of the TSB HO is outlined in **Figure 1.2**. HO's relationship with the engineering team and each of the regional offices is outlined in **Figure 1.3**.

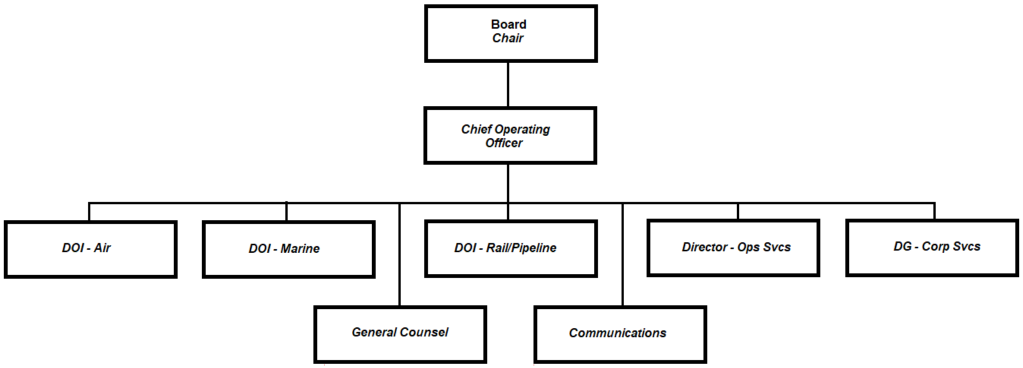


Figure 1.2: TSB HO Organizational Structure

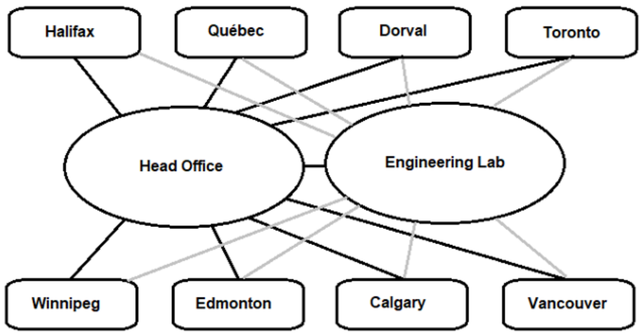


Figure 1.3: TSB HO in Relation to Other Offices

Relocating the TSB HO within the TSTS Hub facility will simplify the day-to-day integration between the HO personnel and the engineering laboratory investigators. This functional programming exercise and the co-location of these teams will allow the TSB to better serve and protect Canadians by advancing safety in air, marine, pipeline, and rail transportation.

2.0 PROGRAMMING GOALS AND OBJECTIVES

2.1 PURPOSE OF THIS DOCUMENT

This functional programming document serves the following purposes:

- Documents the scope of services, operational procedures, and methods (e.g., pathways, projected workload, staffing assumptions, functional relationships, key planning criteria, and detailed room-by-room space requirements) for each program component in the TSTS Hub.
- Provides the Science Hub leadership with the information required to make decisions regarding the programmatic, operational, functional, space, and equipment requirements of the project.
- Forms an important communication tool for the project's main participants and stakeholders, including the design team.
- Serves as an operational planning tool for service providers that may be working together for the first time.
- Provides a mechanism for setting and managing the scope of the project, while not intentionally limiting creative and innovative planning and design solutions.
- Provides the design team, users, and management with a document summarizing key functional, operational, and spatial requirements for the project's design program.
- Provides users, management, and others with a manual to monitor and manage the development of the selected building design to ensure that the design solution accurately addresses functional suitability issues.
- Provides project approval and funding authorities with information to base preliminary capital and operating requirements.
- Provides users and management with a manual to assist the development of administrative and organization policies, new services, and operational procedures for the project.
- Identifies sustainability strategies, tailored to the unique characteristics of the Science Hub, which can be used to fulfill the Laboratories Canada program mandate for environmental sustainability.

2.2 VARIANCES BETWEEN FUNCTIONAL PROGRAMMING AND PREVIOUS REFERENCE DOCUMENTS

The Detailed Functional Programming phase has quantified the science requirements, the TSTS Hub Science Office Accommodations (SOA), the TSB HO GCworkplace, the shared client spaces, and the public spaces of the building. The results of the FW team assessment are outlined in the sections below and in the appendices. The Detailed Functional Programming phase provides two options to meet the program's needs, as shown in **Table 2-1**. Baseline option outlines the science needs as developed with consultation with the TSTS Hub and TSB HO. Further optimization option includes additional building optimization that could be effective in reducing the gross building footprint by 598.15 SQM. The optimization proposed is discussed in **Section 2.3**. The functional programming exercise was able to reduce the building area requirement by 1,152 SQM to 1,750 SQM from the gross area values from the initial TSTS Hub Science Statement of Requirements (SSoR) and the TSB HO SoR (depending on which recommended option is selected).

Table 2-1: Program Options

Space Name	SSoR Gross Area SQM	MPR - FW Forecast Gross Area SQM	66% FPR - FW Forecast Gross Area SQM	100% FPR - FW Forecast Baseline Option Gross Area SQM	100% FPR - FW Forecast Further Optimization Option Gross Area SQM
Sub-Total Science Spaces + Science Support	6,858.00	7,062.00	7,378.20	7,708.66	7,708.66
Sub-Total Non-Science Spaces	1,894.00	1,894.00	1,894.00	1,118.32	1,017.80
Sub-Total Public Spaces and Shared Client Spaces (Science 75%)	1,422.00	1,422.00	1,066.50	867.90	795.15
Building Gross Up Value	*6,925.00*	*5,523.80*	*5,764.82*	*6,133.41*	*6,020.78*
Sub-Total Science Building Size	**17,099.00**	**15,901.80**	**16,103.52**	**15,828.29**	**15,542.39**
Sub-Total TSB HO	2,205.00	-	2,205.00	1,392.00	1,182.00
Sub-Total Public Spaces and Shared Client Spaces (TSB 25%)	-	-	355.50	289.30	265.05
Building Gross Up Value	-	-	*1,664.33*	*1,092.85*	*940.58*
Sub-Total TSB Building Size	**2,205.00**	**0.00**	**4,224.83**	**2,774.15**	**2,387.63**
Total Building Size	**19,304.00**	**15,901.80**	**20,328.35**	**18,602.43**	**17,930.02**

The outdoor space requirements for the TSTS Hub were not adequately accounted for in the SSoR, as shown in **Table 2-2**. The Master Programming phase focused on the requirements of the building science program only. At the 66%, 99% and the 100% Functional programming phases, the outdoor requirements including but not limited to, outdoor storage, loading dock, circulation, fuel storage tanks, and parking needs were further defined. Outdoor science requirements are discussed in **Section 7.0.**

Table 2-2: Outdoor Requirements

Space Name	SSoR Net Area SQM	MPR - FW Forecast Net Area SQM	66% FPR - FW Forecast Net Area SQM	100% FPR - FW Forecast Baseline Option Net Area SQM	100% FPR - FW Forecast Further Optimization Option Net Area SQM
Sub-Total Science Program Outdoor Requirements	1,450.00	1,685.00	5,790.00	4,530.00	4,210.00
Hard and Soft Landscaping (approximately 10%)	0.00	0.00	1,850.00	1,850.00	1,850.00
Covered Bike Storage (43 Bicycles)	0.00	0.00	0.00	85.00	85.00
Parking – Reference Section 7.0 & 11.0	0.00	0.00	3,700.00	5,000.00	2,300.00
Sub-Total Outdoor Space	**1,450.00**	**1,685.00**	**11,340.00**	**11,465.00**	**8,445.00**

2.3 OPTIMIZATION SYNERGIES AND STRATEGIES

The TSTS Hub will co-locate NRC SMPL and the TSB Engineering Lab within one building and site. FW worked with the TSTS Hub to identify synergies in the science areas during both the master and detailed functional programming phases, as described in this section.

The following optimization strategies were identified for the TSB Engineering Lab and the NRC SMPL science spaces:

- Co-locate the NRC SMPL and the TSB Engineering Lab in one TSTS Hub program/building.
- Identify synergies between the NRC SMPL and the TSB Engineering Lab.
- Establish strong operational adjacencies between spaces.
- Locate spaces with similar services/technical demands in proximity to each other.

Co-locating two (2) organizations with similar science programs will create synergies in space, equipment, and resources. These synergies produce a more efficient building program with greater operational flexibility, consistent with the Science Vision for the TSTS Hub. Co-location of NRC SMPL and the TSB Engineering Lab science programs will result in:

- Increased collaboration and research on technical advancements across the various segments of the science programs.
- Shared infrastructure.
- More efficient and productive use of laboratory facilities.
- Greater operational flexibility.
- Optimized capital investments.
- Knowledge transfer between common areas of expertise
- Co-Location of TSB Engineering Laboratories and TSB HO

TSB's long-term strategy will involve co-locating the TSB HO and the TSB Engineering Lab in one building, as described in the SoR for the TSB HO. This is expected to reduce TSB operating expenditures and minimize the challenges associated with having two independent offices. Co-location will foster greater collaboration and communications between the TSB HO, the TSB Engineering Lab, and the NRC SMPL through the use of public and shared client spaces (see **Table 2-3**).

Table 2-3: Public and Shared Client Spaces

Space / Functional Research Area	Space Type
Lobby, Reception, Waiting and Security Area	Public Space
Interpretative Centre	Public Space
Informal Gathering/Event Space	Public Space
Wellness Room/Nursing Room	Shared TSTS + TSB HO Space
Centralized Resource Centre	Shared TSTS + TSB HO Space
Auditorium	Shared TSTS Space
Auditorium Support spaces (kitchenette, storage, a/v control room)	Shared TSTS Space

2.3.1 SYNERGIES

The objective of synergies is to consolidate, share spaces and equipment, and develop a program to minimize the gross building area requirements. This will create a cost-effective infrastructure for scientific research and evaluation. FW's review of synergies for the TSTS Hub identified that the NRC SMPL science programs are within multiple buildings and that the TSB Engineering Lab is within a single building at the 1901 Research Road, Building U-100. The existing synergies (i.e., commonalities) between the NRC SMPL and the TSB Engineering Lab program tools, equipment, and types of facilities are shown in **Table 2-4.** As the functional programming progressed, a new synergy was identified: the creation of a new centralized resource centre that will comprise the areas of TSB HO SPS (Special Purpose Space) resource centre and TSTS Hub resource centre.

Table 2-4: Synergies

Synergies	Space / Functional Research Area	Space Type
S-1	Scanning Electron Microscope (SEM)	Laboratory
S-2	Microscope Lab	Laboratory
S-3	Metallographic Sample Preparation	Laboratory
S-4	Metallographic Section and Specimen Extraction	Laboratory
S-5	Machine Workshop	Workshop
S-6	Material Component Testing	Laboratory
S-7	Experimental Mechanics Lab	Laboratory
S-8	Welding Workshop	Workshop
S-9	Non-Destructive Evaluation	Laboratory
S-10	Physical and Fracto Analysis	Laboratory
S-11	Material Preparation/Equipment Lab	Laboratory
S-12	TSB Engineering Lab and NRC SMPL Shipping and Receiving	Logistics
S-13	TSB HO SPS Resource Centre and TSTS Hub Resource Centre	Shared TSTS + TSB HO Space
S-14	TSTS PPE Storage and TSB HO Deployment Kit	Shared TSTS + TSB HO Space

In addition to optimizing physical resources, space synergies that result from grouping/consolidating equal or similar science spaces in a single space generate the following benefits:

- Improved collaboration between the TSTS Hub team members.
- Increased surge capacity.
- Improved opportunities to share knowledge.
- Optimized use of equipment.
- Facilitated sharing of data and best practices.
- Enhanced opportunities to combine resources and strengthen the science programs (i.e., possibilities for developing new technologies).
- Reduced capital and operating costs.

To establish the optimal space program for TSB HO, FW did the following:

- Reviewed their current space plan, located at 200 Promenade du Portage, Gatineau, QC.
- Used the SoR provided.

- Interviewed the stakeholders.
- Used the GCworkplace calculator tool for the TSB HO program components.
- Used the approved workpoint allocations document dated October 9, 2020.

Co-locating the TSTS Hub and TSB HO within one building will result in spatial efficiencies for the common program elements (e.g., resource centres, storage spaces, amenity areas, and general use spaces for both public and staff use).

2.4 COLLABORATION AND PARTNERING OPPORTUNITIES

The project scope arising from the functional program (basis of design) is designing and building a new facility to co-locate the TSB Engineering Lab and the NRC SMPL science programs personnel and resources. This new facility should be a national CoE. Additionally, the TSB HO will be relocated to this new TSTS Hub facility. Consolidating these two entities in one building will promote shared specialized laboratories and equipment; enhance collaboration between scientists, engineers, and technologists; and create new partnerships with academia and industry. It will also enhance Canada's participation in national and international networks, to facilitate the sharing of knowledge and innovations. Over time, it is expected that new partners and collaborators will become involved through various engagement programs.

The following strategies will maximize collaboration within the TSTS Hub:

- Merge laboratory spaces based on affinities/functional parameters (i.e., synergies).
- Consolidate laboratories by science program (see puzzle exercise outcomes in **Appendix A**).
- Acquire a high-level view of collaboration spaces (e.g., project rooms and open collaboration spaces for the science areas).
- Develop programmed areas within the science spaces that promote collaboration and idea-sharing.
- Account for public/gathering space (e.g., a lobby and an interpretative display area for TSTS Hub projects) to promote spontaneous conversations.
- Develop adjacencies that promote cross-collaboration between the TSB Engineering Lab and the NRC SMPL.

3.0 METHODOLOGY

3.1 SITE VISIT

FW toured the NRC buildings at the NRC Montreal Road Campus (see **Figure 3.1**) on December 12, 2019 and toured the TSB Engineering Lab building (see **Figure 3.2**) on December 13, 2019. During these tours, key representatives from Laboratories Canada, the TSB Engineering Lab, and the NRC SMPL joined FW. Interviews were conducted with key NRC SMPL and TSB Engineering Lab personnel, to better understand the existing challenges with their current science space, the operational requirements, and the adjacencies and process flows that should remain.

A summary of the NRC and TSB Engineering Lab locations visited during the site visits is shown in **Table 3-1**. The list of personnel interviewed during the site visits is shown in **Table 3-2**.

Table 3-1: NRC and TSB Engineering Lab Sites Visited

Building	Location	Scientific Functional Area	Date of Visit
NRC – M03	1200 Montreal Road, Ottawa, ON	• Structural integrity	Dec. 12, 2019
NRC – M07	1200 Montreal Road, Ottawa, ON	• High temperature materials research and development	Dec. 12, 2019
NRC – M13	1200 Montreal Road, Ottawa, ON	• High temperature materials research and development • Metallography and microscopy	Dec. 12, 2019
NRC – M14	1200 Montreal Road, Ottawa, ON	• Structural integrity • Non-destructive evaluation • High temperature materials research and development	Dec. 12, 2019
NRC – M17	1200 Montreal Road, Ottawa, ON	• High temperature materials research and development	Not visited: NRC provided information
NRC – M42A	1200 Montreal Road, Ottawa, ON	• Storage shelled space	Dec. 12, 2019
TSB Engineering Lab	1901 Research Road, Building U-100, Ottawa, ON	• TSB Engineering Laboratory	Dec. 13, 2019

Table 3-2: Personnel Interviewed during Site Tours

Building	Interviewee	Role	Date of Interview
NRC – M03	Min Liao	NRC, A/Director R & D	Dec. 12, 2019
	Andy Christie	NRC, Structural Test and Facility Manager	
NRC – M07	Scott Yandt	NRC, Team Leader High Temperature Materials	Dec. 12, 2019
NRC – M13	Scott Yandt	NRC, Team Leader High Temperature Materials	Dec. 12, 2019
NRC – M14	Min Liao	NRC, A/Director R & D	Dec. 12, 2019
	Andy Christie	NRC, Structural Test and Facility Manager	
	Marc Genest	NRC, Team Leader Non-Destructive Evaluation	
NRC – M42A	Andy Christie	NRC, Structural Test and Facility Manager	Dec. 12, 2019
TSB Engineering Lab	Martin Breton	TSB, Director Operational Services	Dec. 13, 2019
	Jeff Patten	TSB, Manager Systems and Engineering Sciences	
	Ted Givinis	TSB, Manager Recorder and Vehicle Performance	

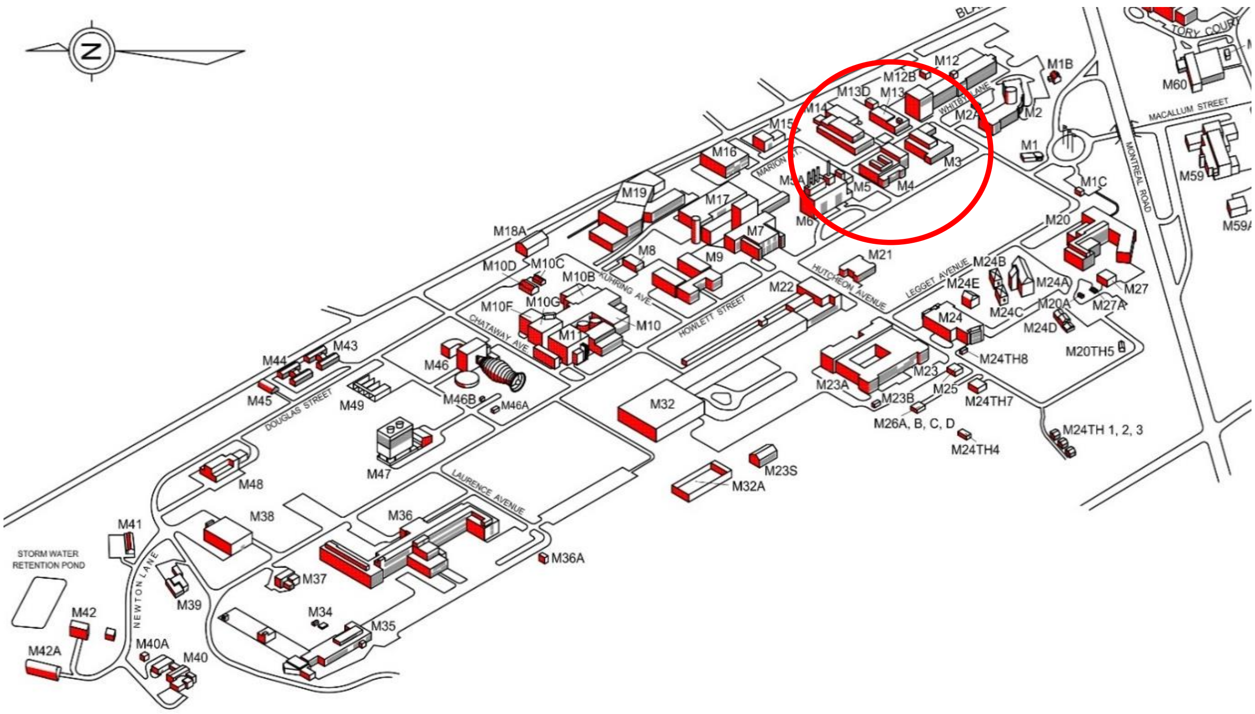


Figure 3.1: Map of the NRC Montreal Road Campus (Ottawa, ON)

Figure 3.2: Map of the TSB Engineering Lab Building U-100 (Ottawa, ON)

3.2 GAP ANALYSIS, SURVEYS, AND QUESTIONNAIRES

3.2.1 GAP ANALYSIS

A series of benchmark and precedent science buildings similar to the TSTS Hub were studied and presented to the stakeholders for review and discussion. Site tours of the existing accommodations were performed with the stakeholders identified in **Section 3.1**. These tours identified gaps in the current facilities (e.g., the aging TSTS Hub assets and the spread of the TSTS Hub across several buildings and a sizeable area) to correctly program the required amount of space, types of spaces, and adjacencies between spaces for a new facility.

Since the requirements for the TSTS Hub are very specific, few buildings worldwide directly reflect its space and operational requirements. The examination of the benchmark buildings focused on the similar space typologies (e.g., high bay, workshop, and traditional laboratory environments) between the benchmark building and the TSTS Hub, to prompt discussion and to identify gaps in service requirements. Extensive equipment inventories and reviews with the stakeholders were held to understand the space and workflow requirements of specific large-scale equipment. This included the test-fit planning of key spaces in the building. The findings from these inventories and reviews were included in the RDSs. The RDSs show indicative plans of the program's key rooms.

FW held a series of workshops with the Client and issued surveys to the Client to ask for their input. The purpose of these workshops was to help the TSB HO component understand any services or gaps in their current accommodations that may be required in the functional program. These surveys and workshops were held for both the TSTS Science program and the TSB HO. The TSB HO SoR that was provided as the basis for the initial program development helped identify gaps in the current space allocations and guided discussions during the workshops and the overall programming efforts. The GCworkplace survey and calculator tool helped identify spaces that could potentially address gaps in the current accommodations. It also helped define a new style of office environment geared to the HO working profile to create a contemporary workplace for the future.

Shared public spaces were discussed during the gap analysis. During Workshop 6, the FW team used images from precedent science buildings to illustrate the shared amenity spaces (e.g., atria, lobbies, auditoria, training spaces, and cafeterias) that exist in more contemporary buildings but are lacking in the current accommodations. These types of shared amenity spaces are included in the functional program.

3.2.2 OFFICE SURVEYS

GCworkplace surveys were distributed to all FTE TSTS Hub and TSB HO employees as follows:

- Sent to the TSTS Hub on April 1, 2020 and returned to FW on April 27, 2020
- Sent to the TSB HO on May 5, 2020 and returned to FW on May 25, 2020

The GCworkplace survey was sent to the NRC SMPL, TSB HO, and TSB Engineering Labs. The objective of the survey was to build an activity profile for the FTEs, to best suit their workplace preferences. GCworkplace tools were used to calculate the overall work point quantities for the TSB HO non-science spaces. An approved distribution for TSB HO was provided to FW on October 9, 2020 and was implemented as part of the programmed areas. FW and Laboratories Canada worked in collaboration with TSTS Hub in the development of the SOA methodology to address the requirements for a science organization of the NRC SMPL and TSB Engineering Labs FTEs. The GCworkplace survey and the supplemental TSTS employee office questionnaire issued at WS3 provided relevant information to start a conversation and develop the SOA.

3.2.3 QUESTIONNAIRES

FW developed a series of questionnaires that were issued to participants before and after workshops. The main purpose of these questionnaires was to clarify information that had been received from participants. The questionnaires also allowed FW to validate the information received from various stakeholders throughout the programming process. A summary list of all the questionnaires is shown in **Table 3-3**.

Table 3-3: Summary of Questionnaires

Questionnaire Name	Issued Date	Topic
Equipment List Questions Tracking Sheet	2020-06-12	Equipment list questions
Workshop 3 Homework: TSB HO Design Principles	2020-07-14	TSB HO provide input on the design principles
Workshop 3 Homework: TSB HO Organizational Chart and Adjacencies	2020-07-14	TSB HO revise their organizational chart and identify adjacencies
Workshop 3 Homework: TSTS Employee Office Questionnaire	2020-07-14	TSTS Hub employee offices
Workshop 3 Homework: RDS Batch 1	2020-07-14	TSTS Hub and Laboratories Canada Security Team to review and comment on RDS Batch 1
Workshop 4 Homework: RDS Batch 2	2020-08-19	TSB HO review and comment on RDS Batch 2
Workshop 4 Homework: TSB HO Office Slides	2020-08-19	TSB HO to identify adjacencies and answer office questions
Workshop 4 Homework: TSTS Crane List	2020-08-19	Crane questions for TSTS
Workshop 4 Homework: RDS Batch 2	2020-08-19	TSTS Hub and Laboratories Canada Security Team review and comment on RDS Batch 2
Workshop 3 Homework Questions	2020-08-26	Follow-up questions on the Workshop 3 Homework responses
Site Questions	2020-09-16	Site questions from the engineers
Workshop 5 Homework: RDS Batch 3 and revised Batch 1	2020-09-18	TSTS Hub and Laboratories Canada Security Team to review and comment on the RDS
Workshop 5 Homework: Workshop 5 Energy Loads Homework	2020-09-18	NRC SMPL to provide energy loads for equipment
Site Questions	2020-09-30	Site questions from the sustainability engineers added to the questionnaire issued on 2020-09-16
WS6 Homework - RDS	2020-12-11	TSTS Hub review and comment on RDS discussed in the workshop.
WS6 Homework - TSTS Hub Offices	2020-12-11	TSTS Hub to confirm the types and quantities for open collaboration spaces
WS6 Homework - Cyclist and Vehicle survey	2020-12-11	TSTS Hub to complete survey
WS6 Homework - RDS SPS	2020-12-11	TSB HO to review and comment on the RDS SPS discussed in the Workshop.
WS6 Homework - TSB HO Office Zoning Diagrams (kit of parts)	2020-12-11	TSB HO to create a zoning diagram.

Questionnaire Name	Issued Date	Topic
WS6 Homework - TSB HO Office Work Point Allocations Table	2020-12-11	TSB HO to identify desired Zones by Function.
Issued Public Realm Questions	2021-01-07	TSB HO and TSTS Hub to reply to questions.
TSB HO Executive Suite – RDS	2021-01-15	TSB HO to review and comment.
TSB HO Executive Suite - Office of the Chair PDF	2021-01-15	TSB HO to review and comment.
TSTS Science - Hazards	2021-03-05	TST Hub to fill in spreadsheet.

3.3 WORKSHOPS AND OBJECTIVES

The FW team worked with representatives from Laboratories Canada, Public Services and Procurement Canada (PSPC), the TSTS Hub, and the TSB HO to identify program requirements and optimizations and to develop this report to inform the future design process. FW established an engagement schedule that consisted of four (4) workshops and online teleconferences (see **Table 3-4**). After each workshop, the FW team provided follow-up meeting minutes and action items to all parties to clearly document the topics that were discussed and that the assumptions were addressed.

Due to the challenges associated with COVID-19 and the inability to conduct in-person interviews and workshops, these sessions were held virtually.

Table 3-4: Workshop Schedule

Workshop	Dates	Topics
Workshop 3	July 7–9, 2020	• Explain the functional programming process • Review and discuss the Master Planning Report • Introduce GCworkplace • Review and discuss GCworkplace survey responses • Review the TSB HO requirements
Workshop 4	Aug. 11–12, 2020	• Review security strategy • Review office and support spaces homework (TSTS Hub and TSB HO) • Review and discuss RDS
Workshop 5	Sept. 15–16, 2020	• Review RDS • Review adjacency diagrams
Workshop 6	Dec. 3, 4, and 8, 2020	• Review science and non-science outdoor requirements • Review security strategy • Review sustainability and energy modelling • Review and discuss RDS • Review public spaces, offices, and support spaces homework (TSTS Hub and TSB HO)

3.4 BENCHMARKING

Benchmarking is a standard by which something can be measured. FW reviewed the benchmarking standard for high bay environments to benefit the TSTS Hub. FW presented laboratory facilities similar to the TSTS Hub to demonstrate planning approaches for its laboratories/workshops, collaborative spaces, circulation, and science office environments. This section highlights the benchmarking projects, high bay environments, and lab typologies that were presented to the TSTS Hub.

3.4.1 BENCHMARKING PROJECTS

The following benchmarking examples were presented to the TSTS Hub:

- Frick Chemistry Laboratory, Princeton University (Princeton, NJ)
- Science Commons, University of Lethbridge (Lethbridge, AB) (see **Figure 3.3** and **Figure 3.4**)
- Forensic Services and Coroner's Complex (Toronto, ON)
- Mike & Ophelia Lazaridis Quantum-Nano Centre, University of Waterloo (Waterloo, ON)
- Interdisciplinary Biocentre, University of Manchester (Manchester, UK)
- Faculty of Pharmaceutical Sciences / Centre for Drug Research and Development (CDRD), University of British Columbia (Vancouver, BC)
- Djavad Mowafaghian Centre for Brain Health, University of British Columbia (Vancouver, BC)
- Chemical and Molecular Biology and Chemistry Building, Ohio State University (Columbus, OH)
- Scott Hall – Nano / Bio / Energy, Carnegie Mellon University (Pittsburgh, PA)
- Energy Environmental Experiential Learning (EEEL), University of Calgary (Calgary, AB)

The following benchmarking examples were provided by the TSTS Hub:

- National Institute for Aviation Research (NIAR), Aircraft Structural Test and Evaluation Center (ASTEC), Wichita State University (Wichita, KS)
- Airbus Wing Integration Centre (Bristol, UK)
- Aerospace Integration Research Centre (AIRC), Cranfield University (Cranfield, UK)
- Industrieanlagen-Betriebsgesellschaft mbH (IABG), Aeronautics Test Halls (Germany)
- NASA Flight Loads Laboratory (FLL), (USA)
- Center for Infrastructure Renewal (CIR), Texas A&M Rellis
- Nationaal Lucht- en Ruimtevaartlaboratorium (National Aerospace Laboratory) (NLR), Netherlands

The benchmark projects studied can help inform design strategies for projects such as TSTS in subsequent design phases. For the purposes of the functional program, the benchmark projects studied helped the FW team consider the following programming objectives:

- What is an ideal arrangement for office, labs, lab support, and collaboration space?
- What is the configuration of an ideal "lab neighbourhood"?
- What is the ideal proximity of offices to labs?
- What is the relationship between the public/collaboration spaces and lab/office spaces?

Benchmarking was also performed to examine best practices for North American lab facilities that have achieved Net-Zero Carbon and/or award-winning performance, and the findings are further discussed in Section 5.2.2 of this report.

Figure 3.3: University of Lethbridge (Lethbridge, AB)

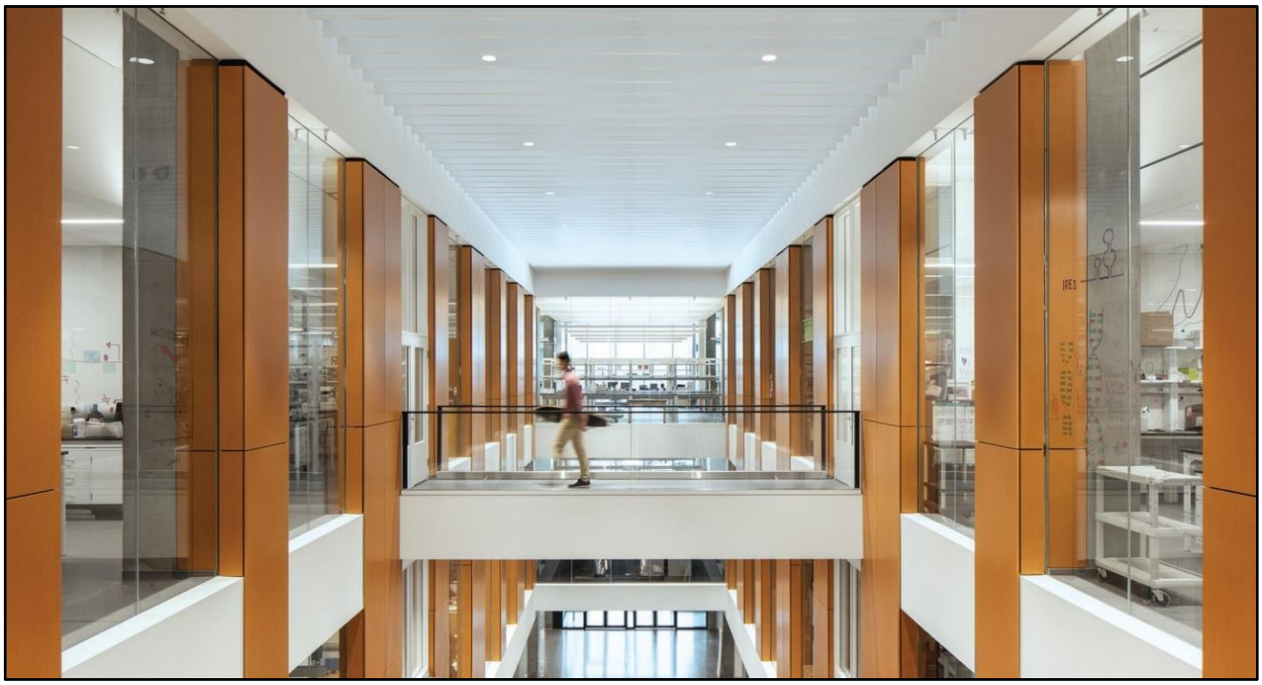


Figure 3.4: Science Commons, University of Lethbridge (Lethbridge, AB)

3.4.2 HIGH BAY ENVIRONMENTS

By their nature, high bay environments (see **Figure 3.5**) are flexible and can accommodate a multitude of uses. Successful high bay environments address the functional needs of the end user (i.e., the type of work dictates the design requirements) and include the following key attributes:

- Integrate major equipment (i.e., overhead gantry cranes and research equipment drive the design of the mechanical and electrical services).
- Provide a floor slab as required for function/research that will allow equipment to be anchored (i.e., a grid of anchors that allows equipment to be positioned in various configurations).
- Provide large overhead doors for exterior access by large vehicles and equipment.
- Optimize use of natural light and views where applicable or allowable.

Care must be taken to avoid implementing too many / too large overhead services as future overhead requirements change (i.e., based on experiments and/or gantry cranes), as these could impede the flexibility of a high bay environment.

Figure 3.5: Georgia Tech University, Carbon-Neutral Energy Solutions Laboratory (CNES) (Atlanta, GA)

3.4.3 LABORATORY TYPOLOGIES

Successful laboratories address the end user's needs using the following key attributes:

- Establish a lab planning module size that is appropriate for the user's needs and that aligns to the structural grid, by coordinating with engineers at the programming stage.
- Establish requirements for circulation and public/laboratory access (e.g., clean and dirty separations may be required and would affect the grossing factors).

- Determine the required containment level, which may affect servicing (e.g., mechanical components).
- Promote flexible design; preference is for open spaces that allow for the expansion and contraction of programs, without the need to modify the building infrastructure.
- Provide appropriate flows to facilitate user workflow requirements inside or outside of labs.
- Promote the concept of science on display by providing visibility into lab/testing spaces from corridors.
- Provide collaborative spaces for informal conversations and meetings (see **Figure 3.6**).
- Provide enclosed rooms for processes that require special consideration (i.e., cleaner environments, audio control, special lighting conditions, and blast control) where required (see **Figure 3-7**).
- Locate all fume hoods and biological safety cabinets away from exit paths and areas of high circulation.
- Develop a modular/scalable servicing methodology that brings mechanical and electrical servicing to labs down to bench level (e.g., in the floor or above the ceiling raceways). This methodology should provide sufficient capacity for future changes in research and should be easily modifiable.
- Use a flexible benching system that can be reconfigured by users based on changing research needs.
- Optimize the use of natural light and views where applicable or allowable.
- Explore the feasibility of modifying exposed ceilings/structures for future servicing requirements and spatial openness, where permitted.
- Plan for horizontal or vertical expansion, depending on the site, loading, and servicing restrictions.

Figure 3.6: Bellevue University, Science Labs (Bellevue, NE)

Figure 3.7: Lampton College, Advanced Material Testing Lab (Toronto, ON)

3.4.4 RECOMMENDATIONS

The discussion of benchmark projects helped inform FW's overall functional program to address the special requirements for the TSTS Hub and the TSB HO. Key lessons learned, and strategies agreed to with the stakeholders through benchmarking, included the following:

- Develop a program for flexible and adaptable high bays, laboratories, and workshops that can be changed overtime as the science programs evolve. This flexibility applies to the physical space and to the services, lab casework, and furniture within the space.
- Address durability and resiliency in the program, specifically regarding materials and finishes defined in the RDSs.
- Optimize the use of natural light and views to the outside, for all space typologies where function permits.
- Develop adjacencies that optimize efficiency in workflows and operations, for all space typologies.
- Provide appropriate and safe operational environments, including appropriate lifting devices (e.g., overhead cranes), working clearances around equipment for safe operations, and provision of appropriate life safety equipment in all high-risk areas.
- Develop as much transparency as possible to support the concept of science on display, where appropriate.

3.5 BROWN SHEET TOOL

A brown sheet is a tool used during programming and design. The term “brown sheet” comes from the time when architects and programmers would use large rolls of brown paper and tape or glue coloured shapes on to the sheets that represent the spaces in the program. It is a graphic depiction of the area tabulation sheet (i.e., a Microsoft Excel spreadsheet that uses the same colour-coding system by space type). While the area tabulation sheet records the calculations required for programming spaces, it is not an effective tool to illustrate spaces as tangible area (i.e., even pie charts have limited effectiveness to properly illustrate these elements).

The shapes on the brown sheet represent the rooms and are relative in scale to each other. If appropriate, they are horizontally and vertically proportional, based on the planning module size (e.g., 3.6 m × 3.6 m).

The brown sheet often includes bounding boxes around groups of spaces to depict potential suites. It is not meant to depict space adjacencies, workflows, or affinities.

The brown sheet is typically posted on a wall for quick reference during workshops. Participants are encouraged to add sticky notes as thoughts are raised regarding spaces during the work sessions and break times. The notes that were generated during several workshops described the lack or surplus of space, the rooms that could be shared, and the rooms that could be repurposed to optimize area and operational productivity.

Refer to **Appendix H** for the latest brown sheet that matches the area tabulations.

3.6 GROWTH CONSIDERATIONS

Flexibility, expandability, and adaptability must be considered for laboratory and science related buildings. To support these considerations, FW programmed the laboratory, laboratory support spaces, and workshops based on a 3.6 m × 3.6 m planning module to forecast net area requirements. This planning module helped FW to establish a planning system that would allows spaces to be easily converted to suit other functions in the future. This planning module is suitable for various configurations / re-configurations of modular laboratory casework and can be adapted to various servicing concepts if servicing requirements change.

Flexibility must be considered for mechanical and electrical systems to adapt to the future requirements of the TSTS Hub (e.g., including ample surplus capacity in risers and branch distribution, providing for various types of mechanical and electrical services, and providing flexible and accessible distribution systems to allow for cost-effective changes).

Volumetric flexibility must also be considered. The three (3) basic science space types planned for the TSTS Hub facility are high bays, wet and dry laboratory spaces, and workshops. The high bay environments are unique and cannot be programmed using the 3.6 m × 3.6 m planning module. FW has currently established three basic building volumetric profiles to meet the space volume needs of the TSTS Hub.

These volumes are high bays (high bay volume), workshops (mid bay volume), and labs and offices (lower volume).

FW may use the same suggested space volume for workshops and labs, to allow ultimate adaptability between workshop and lab spaces. This decision will be determined primarily by cost. Larger volume spaces typically have greater preliminary costs (i.e., a greater exterior building envelope) which can lead to higher long-term operational costs.

High bay environments are specialized spaces that do not fall within the same planning and programming criteria for typical lab environments. A small planning module of 3.6m x 3.6 m does not necessarily make sense for these types of spaces. Planning of high bays is primarily driven by function with the key driver being the provision of open clear area, large span structural systems and flexibility of mechanical and electrical servicing options so the spaces can be easily modified over time. In most cases, high bays deal with large samples and require overhead cranes to move objects in the space and in some science applications, high bay spaces are used to construct full scale pilot projects, that can be in place for several months or longer. Anchoring points both on floors and walls are often needed in high bays which require special design consideration from a structural perspective. High bays often contain industrial types of applications and therefore resilient finishes are also an important requirement. When planning high bays for expansion the ends of the high bay spaces should remain unconstrained if at all possible, to allow growth.

3.7 ADJACENCY, AFFINITY, AND OTHER DIAGRAMS

Adjacency and affinity diagrams and other diagram types (e.g., flow diagrams) are created to understand and apply the key relationships between spaces, groups, zones, teams, and activities. These diagrams are used to show designers the important and potential relationships that can enhance operational efficiency, safety, security, and collaboration.

The affinity diagrams for science were specifically developed to identify spaces and activities with common scientific parameters (i.e., neighbourhoods). The following neighbourhoods were identified for the TSTS Hub:

- High Bay
- High Bay Support
- Logistics
- Shared Workshop
- Image Analysis and Simulation
- Metallography and Microscopy
- Non-Destructive Evaluation
- Structural Integrity and Heat Treatment and Research
- Heat Treatment and Research
- Extraction and Analysis of Vehicle Data

The affinity diagrams also show the desired adjacencies (i.e., primary, secondary, tertiary) as indicated on the RDS. During Workshop 5, FW presented the affinity diagrams and asked the participants (as homework) to closely review the diagrams and ask themselves the following questions:

- What does “affinity” mean to science?
- What does “affinity” mean to the TSTS Hub?
- What does “primary adjacency” mean?
- What does “secondary adjacency” mean?

- What does “tertiary adjacency” mean?
- How does science communicate and collaborate between floors?
- How do staff communicate within a neighbourhood?
- How do staff communicate between neighbourhoods that may be on the same floor?

The flow diagrams and adjacency/affinity diagrams are shown in **Appendix I.**

3.8 EQUIPMENT LIST

Multiple versions of equipment lists were provided by the TSTS Hub to gather the major laboratory equipment requirements. The TSTS Hub evaluated these equipment lists and eliminated equipment duplications by identifying sharable equipment. The equipment parameters were used during the Programming Phase to determine the space requirements and the unique experimental requirements that would inform the cost estimate. Several iterations of the equipment lists were exchanged and updated throughout the programming process, from Laboratories Canada to the FW team. These lists include a significant amount of engineering data. This data must be completed at a later design phase, to produce design documents that correctly reflect the mechanical, plumbing, electrical, data, and structural details. The size, clearances, mass, and shareability of the equipment are the main drivers of this equipment list for the Programming Phase. The requirements defined in the equipment lists have been incorporated into the RDSs.

The equipment list includes several hundred items. These items range from small, benchtop-sized pieces to large-scale elements (e.g., test rigs, load frames, and heavy machinery). FW learned that some of the studies and pieces of equipment could be in place for significant periods of time (i.e., years) which would limit floor area for new studies or other uses. These factors were considered in the development of this Functional Programming Report.

FW’s approach to evaluating the impact of each piece of equipment is summarized as follows:

- Understand equipment requirements based on footprint areas and including safe working environment and servicing around equipment as a driver for space in the high bay and workshop environments.
- Review the major equipment in these spaces, to ensure it was considered and accounted for from a planning perspective (i.e., oversized doors and special access requirements).
- Determine if specialized servicing or loading requirements could influence the engineering requirements.

At a high level, FW reviewed and discussed the following:

- General acoustic properties of equipment.
- Heat rejection requirements of heat generating equipment.
- Fuelling and fire safety requirements of equipment.
- Special needs for hydraulics or other services.
- Safety associated with equipment.

These factors influence the functional relationships between rooms, potential zones, and locations within a building footprint where equipment would logically be located, as well as special building infrastructure and servicing needs.

3.9 ROOM DATA SHEETS

Room Data Sheets (RDSs) are used to communicate the Client's technical requirements to the design team. RDSs can be prepared based on the space type or on a room-by-room level. The RDS for the TSTS Hub were prepared on a room-by-room level. The RDSs inform the programming and design processes by communicating to the design team the requirements for different room types / individual rooms. The RDSs help the design team engage with the users, to better understand the requirements and general provisions for spaces (e.g., the design team can explain why natural ventilation is being used and how it will work).

The RDS process fostered an important dialogue between the TSTS Hub members regarding the sharing of space, equipment, and processes. The RDS champions, assigned amongst the TSTS Hub partners, commented that coordination between users provided them with insight into their new partners' scientific needs and operational protocols. This indicates that the exercise of completing the RDSs supported operational change management.

The RDS for each room include three sheets with the following information:

- **Page 1 of 3** provides a data summary of room information and a detailed breakdown of the various features of the space. Room features are organized by design disciplines (i.e., architecture and structural, mechanical, and electrical engineering and security). This page also includes some qualitative information (e.g., the function and activities in the space, special certification requirements, hazards, and operational hours).
- **Page 2 of 3** provides a conceptual plan of the room to show the extent of the laboratory and the general organization of the parts. The final design may differ from these suggested layouts, but the design intent should be maintained. Elements can include casework, equipment, fixtures, doors, windows, other architectural elements, specialty equipment, and information pertaining to MEP services and utilities. This page includes the major pieces of equipment or instruments from the equipment list. A bubble diagram shows the primary, secondary, and tertiary adjacencies in support of operational affinity(ies).
- **Page 3 of 3** provides 3D axonometric sections to summarize the room information in a graphical illustration. These are included to help the client better understand the space.

FW developed two (2) types of RDS:

- Science RDS for all laboratory, workshops, and engineering spaces, as well as their support spaces
- Non- science RDS for executive suite offices and administrative SPS

Refer to **Appendix C** for a Quick Guide to Understanding Science Room Data Sheets, **Appendix D** for a Quick Guide to Understanding Non-Science Room Data Sheets, and **Appendix E** for the RDSs.

3.10 ESTABLISHING SPACE EFFICIENCY FACTORS (GROSSING FACTORS)

Net area or net square metres **(NSM)** is the area of an individual room or the usable floor area (typically measured from the inside faces of the walls) that is assigned to a function. The Net Areas were identified for programming purposes. For the science spaces, the Net Areas are based on a planning module of 3.6 m × 3.6 m that has been influenced by the development of the Repeatable Laboratory Design Framework (RLDF) work. Actual room or space net areas may be smaller, once the spaces are incorporated into a schematic design and the structural elements (e.g., partitions) are subtracted. Program Net Areas are not to be confused with rentable or usable net areas, which cannot be established until the schematic plans have been developed.

Gross Area is the combined area of all enclosed floor areas and of the supporting structure, as well as certain unenclosed areas that support the building function. Gross area includes the following:

- Net area
- Area of the exterior walls, interior partitions, general circulation corridors and building structure
- Common and service spaces not assigned to a department
- Enclosed mechanical, plumbing, electrical, and communications (IT) spaces
- Vertical circulation spaces, including elevators, stairs, escalators, shafts, and stacks
- Any other areas that make up the entire building

Washrooms and custodial spaces are also typically included in the gross area unless they have a specific support function. Some net area spaces are not counted in the gross area (e.g., exterior uncovered terraces, ramps, pads, balconies, courtyards, open- air mechanical spaces, and utility tunnels).

The grossing factors or gross **(GF)** presented in **Table 3-5** are based on historical precedents for this type of facility and industry norms. Generally, these values increase as the space types become more dependent on the mechanical, plumbing, electrical, and communications (IT) spaces and additional circulation.

Table 3-5: Grossing Factor by Space Type

Space Type	Grossing Factor (GF)
Science High Bay Laboratories	1.25
Science Workshops	1.85
Science Laboratories	1.85
Science Laboratory Support	1.85
Science Logistics	1.85
TSTS Science Office Area	1.65
TSB HO Area	1.65
TSTS Public Spaces	1.65

The grossing factor value of 1.25 used for high bay laboratories is typical for high bays.

The Science-related Logistic spaces used a grossing factor value of 1.85. These spaces would be inherently located adjacent to science high bays, laboratories, or workshops. The mechanical, plumbing, structural, and electrical systems are an extension of the laboratories systems, using the same shafts and elevators as the laboratories and workshops.

The grossing factor for the laboratory offices could be higher than of 1.65, depending on how the offices are designed. For example, if the laboratories and offices are immediately adjacent and the offices are not on a separate (i.e., less sophisticated) engineering system, the offices are essentially an extension of the laboratories and will be programmed with a higher grossing factor of 1.85.

The grossing factors values described on table 3-5 were applied to all areas of the functional program per space type. Refer to Appendix O for Grossing Area Table – Indoor Requirements.

3.11 GCWORKPLACE STANDARDS AND SURVEY

The GCworkplace initiative aims to provide office space that delivers a flexible, functional, safe, healthy, and responsive environment which meets operational needs while maximizing the use of space. The GCworkplace vision was formed and oriented towards seven dimensions: flexible, digital, efficient, green, inclusive, collaborative, and healthy.

Activity-Based Workplace (ABW) is a concept within the GCworkplace Fit-Up Standards. ABW recognizes that people engage in many different activities each day and that they need different types of work settings to accommodate these activities. ABW is an unassigned work environment that provides employees with a variety of work points (i.e., places where work can be performed). ABW respects employees' needs for acoustic and visual privacy for individual and collaborative work, to support wellness and reduce stress in the workplace.

As part of the front-end planning process in collaboration with Laboratories Canada, the TSB HO, and the TSTS Hub, Laboratories Canada issued a GCworkplace survey to all members of the TSB HO and the TSTS Hub. The GCworkplace survey information helped establish the high-level space needs of the TSB HO and the TSTS Hub. FW used information from additional sources to determine the SPSs and office space requirements for the science office accommodations of the TSTS Hub (see **Figure 3.8**). These sources included the following:

- Workshops
- Questionnaires
- The ABW Working Group
- GCworkplace standards

The GCworkplace survey does not differentiate between SPS and office space needs. SPSs are customized based on the unique needs of the individuals and the scientific tasks being performed. The functional programming exercise determined how much SPS is needed in comparison to general purpose office space. It is expected that more than 70% of the new TSTS Hub facility will consist of SPS.

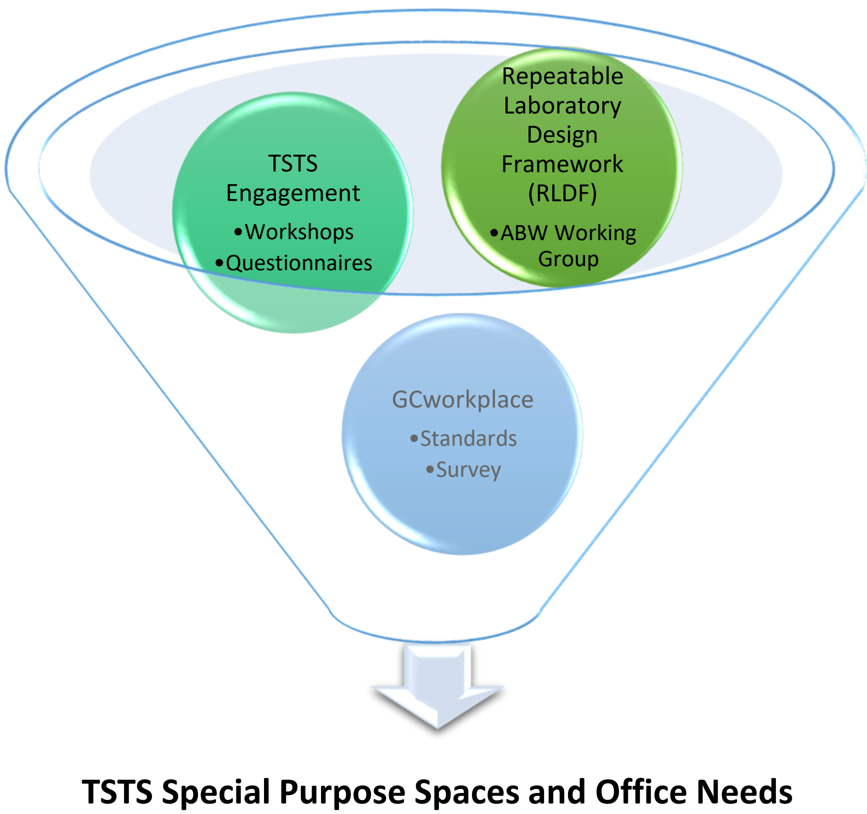


Figure 3.8: Sources to Determine Special Purpose Space and Office Space Needs

3.12 APPLICABLE CODES AND STANDARDS

The applicable codes and standards applicable to this project include, but are not limited to, the following:

- National Building Code of Canada, latest version, including its amendments
- Ontario Building Code (latest version with amendments applicable if project in Ontario)
- National Fire Code of Canada, latest version, including its amendments
- Model National Energy Code for Buildings
- LEED V4.1
- Accessibility for Ontarians with Disabilities Act (AODA) – Integrated Accessibility Standards, O. Reg. 191/11 complete with amendments. (applicable if project in Ontario)
- Ontario Occupational Health and Safety Act (applicable if project in Ontario)
- Draft RHF Accessibility Design Guidelines for Laboratories
- CSA B651-18 – National Standard of Canada – Accessible Design for the Built Environment
- Safety Code 34. Radiation Protection and Safety for Industrial X-Ray Equipment
- REGDOC-2.5.5, Design of Industrial Radiography Installations
- Refer to Structural, Mechanical and Electrical sections below for additional codes and standards

4.0 FUNCTIONAL PROGRAMMING

The programming effort focused on establishing the overall space needs of all stakeholders (e.g., the science programs, office accommodations, and shared public spaces that are required for the future development of the final design). Program requirements were derived through a series of workshops, questionnaires, reviews of existing spaces, and detailed reviews of equipment and workflows. Space program requirements were further defined by GCworkplace and the SOA/SoR provided by Laboratories Canada. The program developed is specific to the needs of the TSTS Hub and the TSB HO and establishes the correct area and adjacency requirements for the building and its future occupants.

The steps to develop the program included the following:

- Establishing a Master Program that confirms the baseline space needs and adjacency requirements for the project. During this phase, an optimization exercise was conducted to identify synergies/affinities in science programs. This resulted in optimization of resources and space allocation for the science areas.
- Refining and developing the Master Program by adding more details (e.g., office accommodations, detailed RDSs, and indicative layouts), including optimization of space. Further synergies were identified in semi-public areas, and RDS layouts were developed in greater detail to produce ideal space layouts.
- Submitting a 66%, 99% and a revised 99% Functional Program report to stakeholders for review and input.
- Producing this 100% Functional Program report as data was collected and refined.

4.1 FTE TABULATION

The TSB Engineering Lab and the NRC SMPL provided their respective organizational charts, which included the total anticipated FTE counts for the TSTS Hub science programs (see **Table 4-1**) and the TSB HO (see

Table 4-2). The Functional Programming process allowed FW to confirm that the anticipated FTE counts have not changed from those presented in the SSoR for science programs and in the SoR for the TSB HO.

Table 4-1: FTE Tabulation for the TSB Engineering Lab and the NRC SMPL Science Programs

Section	FTE	Subtotal
TSB Engineering Lab	24	28
TSB Engineering Lab Visitors/Industry	4	
NRC SMPL	51	66
NRC SMPL Visitors/Students	15	
Shared Flex/Surge Staff Level	4	4
Total Science Programs		**98**

Table 4-2: FTE Tabulation for the TSB HO

Section	FTE
Office of the Chair	13
Communications Branch	16
General Counsel	5
Air	14
Marine	7
Rail + Pipeline	11
OPS Services	20
Corporate Services	43
Shared/Flex Staff	19
Total for the TSB HO	**148**

4.2 SCIENCE AREA

Developing the space program for the science areas was the first step taken in developing the master program. The science areas are the key drivers of the overall gross building area for the project. The science areas are the largest spaces both in area and volume; therefore, they provided the greatest opportunities for optimization and potential overlap resulting from co-location of the TSB Engineering Lab and the NRC SMPL in one building. The science spaces have specialized systems and services and engineering requirements. Developing a basic program approach for the science areas allowed the input from engineering to closely follow the architectural programming workflow. This approach allowed detailed RDSs and test-fit plans to be included in the final space program.

FW conducted area analysis for TSTS Hub at the Master Programming and 66%, 99% and 100% Detailed Functional Programming phases. The information in this report is specific and detailed to guide building design and site development. To determine the overall building area, FW used the area tabulation (see **Appendix F** and **Appendix G**) and applied the established grossing factor per space type (see **Table 3-5**) to each area in the area tabulation.

4.2.1 GAP REVIEW/NEEDS ANALYSIS – SCIENCE AREAS

FW developed an approach to forecasting space needs. The approach was an extension of the discussions held with the TSTS Hub, regarding accommodation gaps in the current facilities and additional space requirements for the future. The approach accounted for the following:

- (a) Existing Spaces that are required in the future building, with a current size that is adequate.
- (b) Existing Spaces that are required in the future building, with a current size that is inadequate.
- (c) Missing Spaces that are required for the future building.
- (d) Redundant Spaces that are no longer required / duplicated spaces between programs where space optimization could be achieved.

The approach used the formula below:

TSTS Science Spaces Net Programmable Area = [a + b + c – d]

FW focused on the key spaces, laboratories, workshops, and high bay science spaces required to solve the equation. FW used the equation as the foundation for the TSTS Hub program. The new programming allocation required for the TSTS Hub to meet functional program requirements (for the science areas only) is shown in **Figure 4.1**. The resulting calculations indicate that 64% of the existing spaces must be increased and 29% of the science spaces must be created (see **Figure 4.1**).

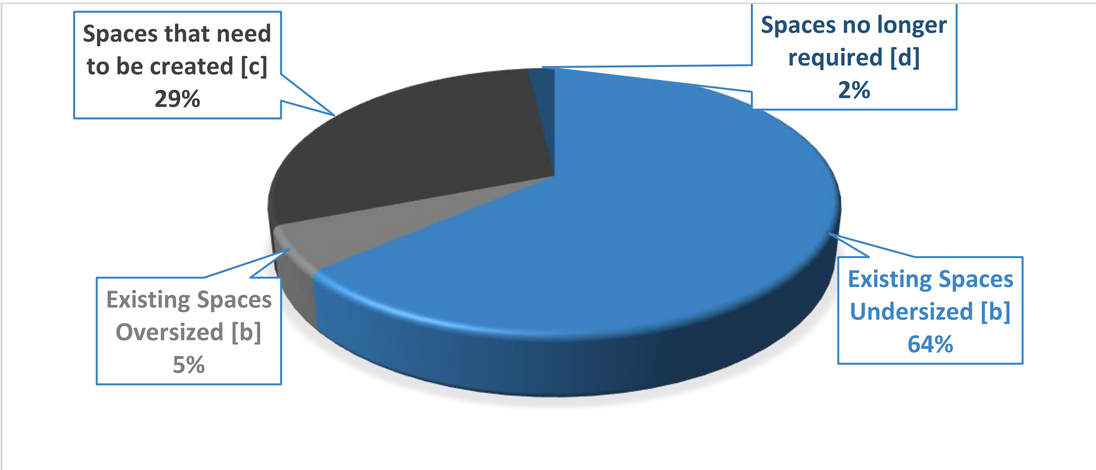


Figure 4.1: Gap Analysis

Areas in NSM for the new spaces required by the TSTS Hub to enhance and support the science programs are shown in **Table 4-3**. Spaces that are no longer required for the science program are shown in **Table 4-4.**

Table 4-3: Spaces that need to be created [c]

Program	Space ID	Room/Space Name	Space Type	Area (NSM)
TSB Engineering Lab	3.3C	CVR/FDR Collaboration Area	Laboratory	93.60
	3.3D	Audio Booths – NVM/Flight Recorder Lab	Laboratory	97.20
	4.4	Battery Storage Room	Laboratory Support	29.16
	4.5	Wreckage Storage	Laboratory Support	77.76
	5.4	Universal Locker Area and Clean Room	Logistics Support	71.44
	5.5	Protective Personal Equipment Storage	Logistics Support	51.84
			Total TSB Engineering Lab Spaces (NSM)	**421.00**
NRC SMPL	3.7	Spin Rig Prep Room	Laboratory	38.88
	4.2	Pump Room	Laboratory Support	77.76
	4.6	Full Scale Testing Equipment Storage	Laboratory Support	90.72
	4.11	Gas Cylinder Storage	Laboratory Support	17.10
	4.13	Burner Rig Storage	Laboratory Support	12.96
			Total NRC SMPL Spaces (NSM)	**237.42**
TSTS	4.3	SEM Lab Support Room	Laboratory Support	21.64
	4.7	NDE Equipment Storage	Laboratory Support	25.92
	4.8	Material Testing Equipment Storage	Laboratory Support	48.60
	5.1	TSTS Shipping and Receiving	Logistics Support	38.88
			Total TSTS Spaces (NSM)	**135.04**
			Total Spaces (NSM)	**793.46**

Table 4-4: Spaces No Longer Required [d]

Program	Room/Space Name	Space Type	Area (NSM)
TSB Engineering Lab[1]	Media Storage Room	Laboratory Support	17.00

4.2.2 SCIENCE AREA VARIANCE COMPARISON

The net area variances for science spaces between the various phases of programming to date are shown in **Table 4-5**. There is an increase of approximately 12% in net science area between the original SSoR and options 1 and 2 of the 100% Functional Program.

This change in net area between the SSoR and forecasted options is the result of several steps taken during functional programming, as listed below:

- A comprehensive gap analysis (refer to **Section 4.2.1)** of the existing facilities was performed to identify new spaces and remove spaces no longer required in the science areas. Six rooms were created for the TSB Engineering science program (421 NSM), five rooms were created for NRC SMPL (237.42 NSM), and four rooms were created for TSTS shared spaces (135.04 NSM). The total area of these new rooms is 793 (NSM). These new rooms include three laboratories (i.e., CVR/FDR collaboration area, audio booths for NVM, and Spin Rig Prep Room), and 12 new laboratory support spaces (e.g., battery storage room, wreckage storage, pump room, and NDE storage).

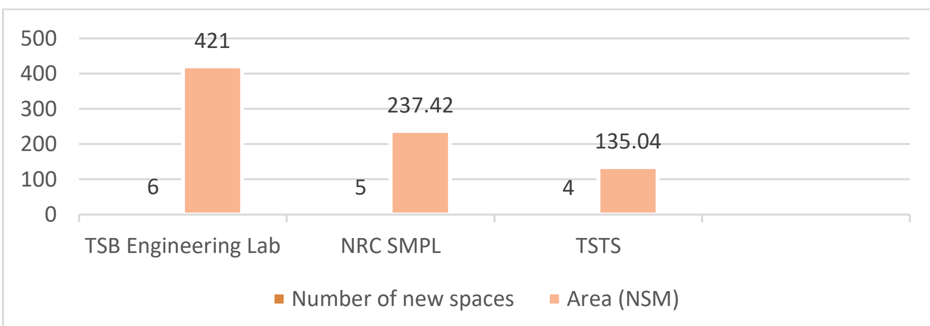


Figure 4.2: New spaces and areas

- Refer to **Section 2.3.1** for a detailed description of synergies. Fourteen synergies were identified in the program, including laboratories, logistics support spaces, workshops, and shared TSTS and TSB HO spaces. Most of the synergies identified were in the laboratory areas, as shown in **Figure 4.3**.

[1] It is noted that there is no longer a requirement for the TSB Engineering Lab to have a media storage room as the TSB HO will carry this media storage as their SPS.

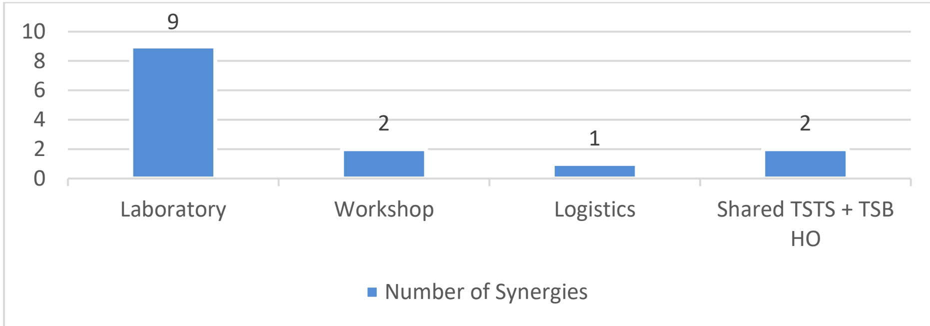


Figure 4.3: Synergies per space type

- Detailed and iterative development of RDSs resulted in optimal layouts for each space, based on the required equipment and activities/workflow for each space. Changes in area between forecasted Master Programming areas and Functional Programming areas are tracked in **Appendix G** (column labeled "Difference").
  For example, the machine shop (space ID 2.5-RDS 007-2) increased from 388 SQM during Master Programming to 503.50 SQM during Functional Programming (i.e., an increase of 114.70 SQM). During Master Programming, the proposed space was based on informed assumptions that were later tested during Functional Programming. During the early stages of Functional Programming, the machine workshop layout didn't provide space for an SPS laboratory office or for a machine shop storage area. The inclusion of these spaces, in addition to detailed equipment information layered on top of circulation and safety zones, produced the final 503.50 SQM layout shown in **Figure 4.4**. Note that this space is essential to TSTS operations and that it will be used extensively by TSB Engineering and the NRC SMPL.

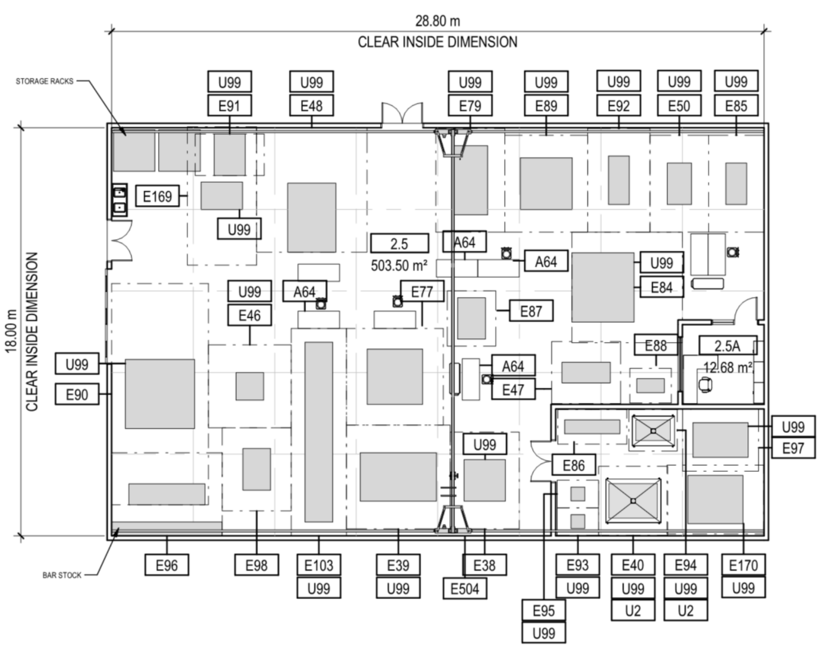
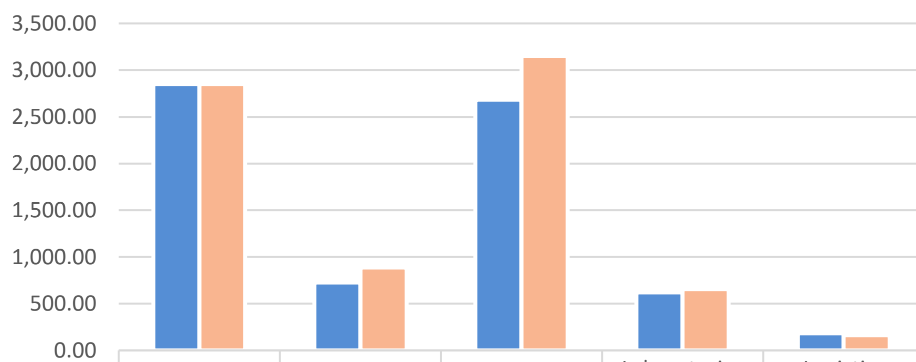


Figure 4.4: Machine Workshop Functional Programming Layout

Figure 4.5 illustrates the space evolution (per space type) in science areas, from Master Programming to Functional Programming. Compared to the Master Programming areas, the high bay environments had zero variances during Functional Programming. This is due to the early development of these areas as essential spaces to TSB Engineering and the NRC SMPL. A balanced and advantageous layout emerged during master programming; minor adjustments were made during Functional Programming without impacting the net areas established. Workshop spaces increased by 22% during Functional Programming, mainly due to an increase in area of the machine shop (refer to **Figure 4.4**) and the wood workshop, which required additional space for shop equipment. Laboratories increased by 17% during Functional Programming, due to the creation of new spaces as described above and in **Section 2.3.1**. As more detailed information became available during the development of the RDS, the laboratories areas were adjusted as needed to provide optimal layouts for the allocation of equipment, mobile furniture, and work and safety zones. Laboratories support spaces remained nearly identical; logistics support spaces decreased by 11%, due to the NRC SMPL and TSB Engineering sharing shipping and receiving areas.



	High Bay	Workshops	Laboratories	Laboratories Support	Logistics Support
Master Programming	2,850.00	725.76	2,682.72	622.08	181.44
Functional Programming	2,850.00	888.78	3,151.94	655.78	162.16

■ Master Programming ■ Functional Programming

Figure 4.5: Space Evolution Master to Functional Programming per space type

Table 4-5 illustrates the net area variances for science spaces during the original SSoR, Master Programming, and the 66% and 100% Functional Programming stages.

Table 4-5: Variances in Net Areas for Science Spaces

Science Space Name	SSoR Net Area SQM	MPR - FW Forecast Net Area SQM	66% FPR - FW Forecast Net Area SQM	100% FPR - FW Forecast Baseline Option Net Area SQM	100% FPR - FW Forecast Further Optimization Option Net Area SQM
Science Spaces					
High Bays	6,858.00[2]	2,850.00	2,850.00	2,850.00	2,850.00
Workshops		725.76	848.88	888.78	888.78
Laboratories		2,682.72	2,916.84	3,151.94	3,151.94
Laboratories Support		622.08	594.00	655.78	655.78
Logistic Support		181.44	168.48	162.16	162.16
Sub-Total Science Spaces + Science Support	**6,858.00**	**7,062.00**	**7,378.20**	**7,708.66**	**7,708.66**

4.3 TSTS HUB SCIENCE OFFICE ACCOMMODATION

In collaboration with Laboratories Canada, FW has been developing the SOA methodology to facilitate programming of science office areas. The SOA process acknowledges that the GCworkplace process for designing office spaces does not account for the imminent differences between general and science offices. Characteristics unique to the science offices include specialized IT and equipment, and different modes (i.e., visual, physical, audible, and security) and privacy levels required for specific work points and office areas.

The SOA (in-progress) process allows for the following:

- Flexibility (i.e., SOA spaces areas are designed to fit within the 3.6 × 3.6 lab planning module to make future space transformations feasible and efficient).
- Various open and enclosed collaborative work points to accommodate specific requirements for different users.
- Co-creation and collaboration opportunities, using formal and informal gathering spaces (e.g., dedicated science project rooms, huddles, and teaming areas).
- A healthy work environment providing support spaces for relaxation, breaks, and socialization.
- SOA spaces designed to accommodate a variety of users in an interactive and adaptive working environment, including assigned and unassigned work points.

SOA Individual Work Points include the following open and enclosed space solutions:

- Enclosed individual work points (e.g., shared science focus rooms and enclosed workstation areas that provide support for individual focused work).

[2] SSoR value includes the Hazardous Storage (18 SQM) and Light Industrial/General Storage (1,147 SQM) values from the Master Programming report

- Open individual work points (e.g., workstations that are spaces for mid-term to long-term focused science work). Flexible furniture could include sit/stand options (see **Figure 4-2**), and panels between work points could provide visual and acoustic separation.

SOA Collaborative Work Points include a variety of open and enclosed spaces:

- **Open Collaborative Spaces** (e.g., chat points, huddle spaces, teaming areas, and lounges) foster social interactions between staff members and provide a relaxed environment to work in or to recharge from daily tasks (see **Figure 4-3**).
- **Enclosed Collaborative spaces:**
    - Medium and large meeting rooms are intended for more formal meetings, where team members and clients can have a conversation/work session in a private setting but still be connected to the adjacent spaces.
    - Lab project rooms are special spaces designed for science collaboration. These are intended to be used for mid-term to long-term group work or meetings and ideally located adjacent to the laboratory entry points or vestibules.
- **SOA support spaces:**
    - Kitchenettes are a shared support area designed to accommodate science employees for food service and casual conversation. These could be open or semi-enclosed spaces with visual separation from workspaces. These should be near lounges and meeting rooms, to be able to function as serveries if necessary.
    - Equipment and Storage are shared support spaces designed to accommodate science office supplies.
    - Lockers are individual storage lockers located in a centralized area. A coat closet and a variety of locker types will be provided.

For the spaces mentioned above, certain aspects (e.g., demountable partitions, appropriate selection of furniture, and access to technology) will play a key role in achieving flexibility and a progressive work environment. The goal is to provide a space solution that facilitates the daily tasks and fosters a true collaboration.

The following steps describe the process used to program the TSTS Hub science offices:

- ***Workshop 3:*** FW issued homework in the form of the Employee Office Questionnaire to the Science Hub, to gather information regarding the Science Hub's current office requirements to design the new work areas. FW gathered information regarding the population breakdowns by science programs, the frequency of use of laboratories in comparison to current work points, and the specific IT and privacy requirements. This information outlined the science office requirements for TSTS.
- ***Workshop 4:*** FW socialized the findings and understanding of the Employee Office Questionnaire, presented space planning strategies for office and science integration, and reviewed work points and support spaces with the TSTS Hub.

- ***Follow-Up Meetings:*** these were a series of meetings focusing on specific topics, including the SOA. FW updated the SOA areas based on an updated version of the SOA calculator and the SOA catalogue. Active engagement and feedback from the TSTS Hub assisted during this iterative process and made it possible to develop office typologies for the science offices. The TSTS Hub also provided input on the SOA distribution, and relationships to other science zones and neighbourhoods.

Figure 4.2: CJ Blossom Park Laboratory (Suwon, South Korea)

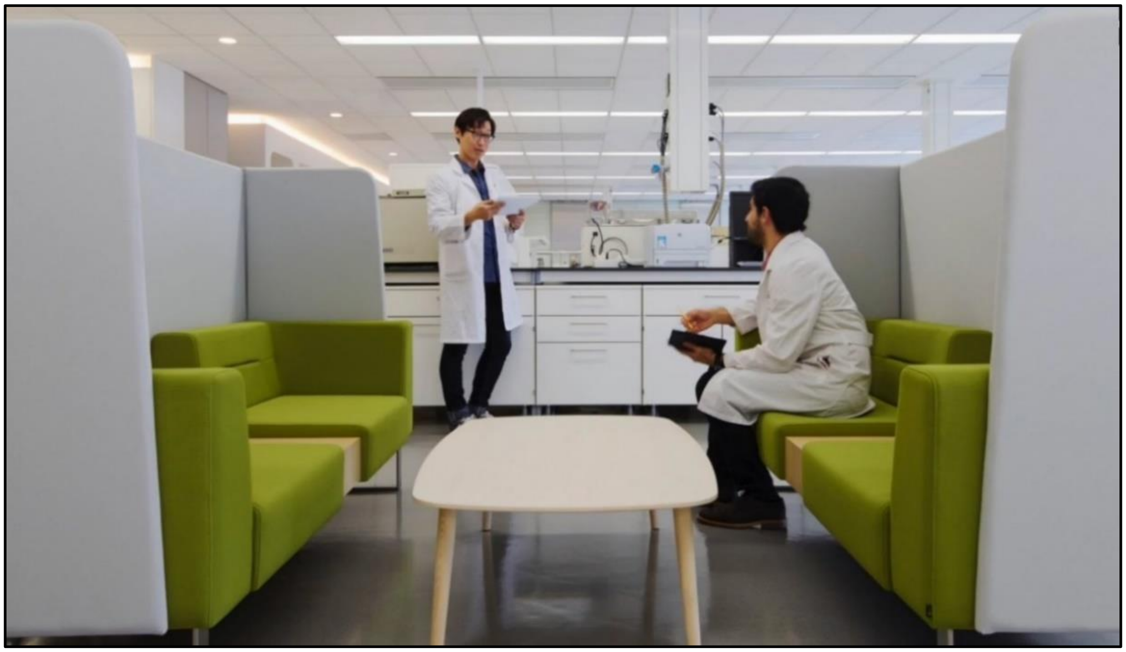


Figure 4.3: CJ Blossom Park Laboratory (Suwon, South Korea)

4.3.1 TSTS HUB SUMMARY AREA

The FW team developed a SOA calculator (Refer to **Appendix N**) and an SOA office and work point typology catalogue to be applied to TSTS Hub and other Laboratories Canada projects under the same umbrella. After review with the TSTS Hub and Laboratories Canada, the SOA Area Tabulation presented in **Table 4-6** was agreed to by all. SPS offices inside laboratories and workshops are not included in SOA calculator. The offices are captured as part of the laboratories or workshops areas and are included in Science RDS (refer to **Appendix E**) and Science Area Tabulation (refer to **Appendix G**).

Table 4-6: SOA Area Tabulation

	Room/Space Name	Space Type	Number of spaces	Net Area Functional in SQM per space	Total Net Area Functional in SQM
INDIVIDUAL WORK POINTS	Shared Science Focus Room	Enclosed Individual	7	7.50	52.50
	Open Office Work point (2 person per module) [3]	Primary individual open	66	6.48	427.68
	Hot Desk (4 person per module) [4]	Primary Individual open	8	3.24	12.44
	Enclosed Workstation (Trans. Safety, Matls Perf.)	Enclosed Individual	14	9.72	136.08
	Enclosed Workstation (Trans. Safety, Matls Perf.)	Enclosed Individual	2	12.96	25.92
	Sub-Total Individual Work Points				**654.62**
COLLABORATIVE WORK POINTS	Chat Point	Collaborative open	4	4.32	17.28
	Huddle	Collaborative open	4	6.48	25.92
	Teaming Area	Collaborative open	1	13.80	13.80
	Lounge	Collaborative open	0	0	0.00
	Phone booth	Collaborative enclosed	6	4.32	25.92
	Lab Project Room (2 modules = 3.6x7.2)	Collaborative enclosed	3	25.92	77.76
	Medium Meeting Room	Collaborative enclosed	2	32.40	64.80
	Large Meeting Room[5]	Collaborative enclosed	2	64.80	129.60
	Sub-Total Collaborative Work Points				**355.90**
SUPPORT SPACES	Kitchenette (5 SQM/25 person)	Support space		19.60	19.60
	Equipment (10 SQM/25 person)	Support space		39.20	39.20
	Lockers (0.5 SQM/person unassigned)	Support space		49.00	49.00
	Sub-Total Support Spaces				**107.80**
	Total SOA spaces				**1,118.32**

[3] One module is 3.6 SQM by 3.6 SQM = 12.96 SQM
[4] Reduction Factor for Hot Desk as per SOA Standard
[5] Size of one large meeting room is 64.80 SQM. One of the large meeting rooms must be adjacent to the auditorium

4.3.2 TSTS HUB SOA VARIANCE COMPARISON

Table 4-7 demonstrates the variances in net areas for science office accommodation between the various stages of programming to date. It is noted that there is approximately a 40% decrease in science office area between the original SSoR and the Baseline option 100% Functional Program. If further optimization is applied to the program as outlined in Further optimization option (refer to **Section 11.2**), the net area can be reduced by 46% from the initial SSoR submission.

The resulted delta in areas between the SSoR and forecasted options are the result of applying the approved SOA methodology to TSTS.

Table 4-7: Net Area Variances for SOA

Space Name	SSoR Net Area SQM	MPR - FW Forecast Net Area SQM	66% FPR - FW Forecast Net Area SQM	100% FPR - FW Forecast Baseline Net Area SQM	100% FPR - FW Forecast Further Optimization Net Area SQM
TSTS SOA					
SOA - Individual Workspaces	1,894.00	1,894.00	1,894.00	654.62	590.00
SOA - Collaboration Work Points				355.90	320.00
SOA - Support Spaces				107.80	107.80
Sub-Total Non-Science Spaces	**1,894.00**	**1,894.00**	**1,894.00**	**1,118.32**	**1,017.80**

4.4 TSB HO OFFICE SPACE

TSB HO office areas are following the GoC GCworkplace Fit–Up Standards. GCworkplace is not applicable to science offices as described in **Section 4.3**. Framework team implemented GCworkplace Workbook guided by GCworkplace Solutions for TSB HO only and facilitated workshops to discuss both survey results and GCworkplace Workbook outputs.

The GCworkplace Workbook is a mandatory tool to assist design professionals to calculate baseline work point quantities (individual, collaborative) and support spaces tailored to each activity profile. This tool is auto-calculated but there are opportunities to adjust these distributions based on project – specific needs, provided that the total proportions of each work point category remain within the approved ranges identified by the activity profiles.

GCworkplace Survey Results indicated a balanced activity profile leaning slightly towards an autonomous work environment based on the data provided. A balanced profile means an organization with moderate interaction, mostly within teams. It has the most balanced distribution of work points, with an equal proportion of individual and collaborative work points.

The following were important facts that were extracted from our review of the survey[6]:

- Between 90–100% of time spent in office.
- Majority of staff are accommodated in an open office environment (workstations).
- Adjacencies are important between group members of the same department.

[6] Survey results Pre-Covid

- A quiet work setting is important free of visual distractions.
- Speech Privacy is extremely important for phone calls or teleconferences.
- Spaces that support collaboration is extremely important and spaces to recharge/take a break.
- Mobile Group – Laptops or tablet computer plus two (2) monitors.
- Preference for tele-working style (33% of people indicated that they are currently working from other place than their primary workplace between 1-2 days, plus another 25% indicated 3+ more days/week).

Figure 4.4: PSPC Office (Ottawa, Canada)

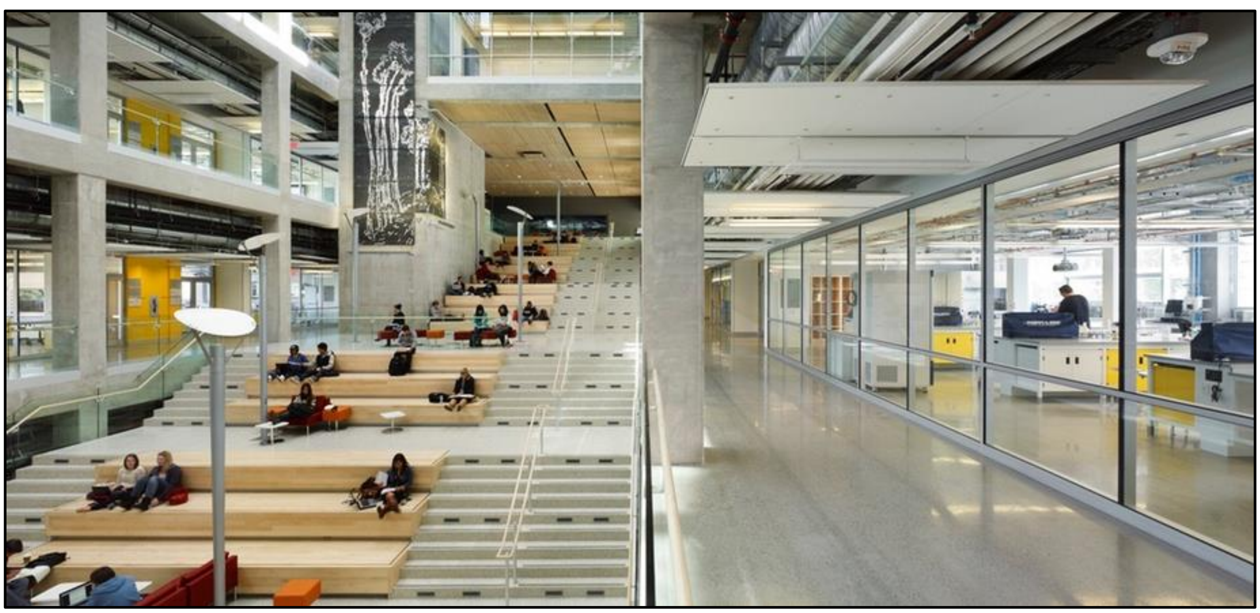


Figure 4.5: EEEL, University of Calgary (Calgary, AB)

Based on the long-term strategy objectives stated in the TSB HO SoR, relocating the TSB HO away from the TSTS Hub is not considered to be a viable option. The long-term strategy for TSB HO SoR has identified the following objectives for the new head office:

- Relocate and consolidate the TSB Head office with their laboratory functions under a single roof in the Ontario side of the National Capital Area, in an industrial zone, away from the Centre core of Ottawa.
- New facilities are to be close to the major transportation lines as this would be more practical for the transportation of large evidence pieces such as boat, train and aircraft parts.
- Encourage the retention of highly specialized resources required to deliver its specific mandates.
- Reduce TSB operating expenditures and operating challenges of having two offices in the NCR which are currently 16 kilometers apart.
- Respond to Science and Parliamentary Infrastructure Branch (SPIB) government initiative to consolidate multiple existing lab facilities from the science cluster into one hub.

4.4.1 TSB HO SPECIAL PURPOSE SPACES

Special Purpose spaces are spaces that do not follow in the typical categories of GCworkplace. These spaces are unique to the TSB HO functional program as identified in the SoR, GCworkplace calculator and **Table 4-8**. In addition, FW provided RDS to describe TSB HO SPS spaces listed below apart from the standard computer room:

- Records/Filing: Room for filing confidential documentation. The layout of the space includes high density shelving units and workstation for records staff.
- Special Clothing Equipment: Special clothing equipment room with mobile shelving.
- IT Equipment: Room for storage of computers and peripherals complete with some ability to work on/setup computer devices.
- Communication Equipment: Room for storage of communication equipment, storage of displays, signage, and other communications tools.
- Administrative Equipment: Room for storage of office supplies, some controlled equipment (mobile phones)
- Telecom and Server Room: Room for phone/data connectivity infrastructure/equipment, servers, etc. Exact use will be further defined once the IMIT strategy for the building is developed. Preliminary requirements listed: 4 racks equipment cabinets, U-shaped - suspended cable raceways
- Deployment kit storage: Room for storage standard issue kit included large hockey bag plus additional smaller bag(s) – individual/assigned to investigators and others who deploy. This SPS supports the storage of travel items for field work as the deployment kits contain the tools, materials need for field work. SPS combined with TSTS PPE storage.
- Training Equipment Storage: TSB offers a large amount of the training to their FTEs. This space provides storage for the significant materials used to deliver these training sessions. Requires ample shelving and a large, closed storage unit. This room will have restricted access to short personnel.

4.4.2 OFFICE SUMMARY AREA

In consultation with TSB HO and Laboratories Canada with the application of GCworkplace space planning workbook as shown below, FW developed summary **Table 4-8**, which outlines the space requirements of the TSB HO program in a more simplified way when compared to the GoC workbook version.

The GCworkplace workbook space planning was developed considering usable square meters. In the case of TSB HO 1955.61 SQM is the total usable area. From this total area, the circulation factor and building fit factor are subtracted to establish the remaining space for planning. An area of 1,153.81 SQM is the area allocated for different types of workpoints, SPS and support spaces. The target occupancy for TSB HO is 163 FTE. GCworkplace allocates 12 SQM per FTE, therefore, 163 FTE x 12= 1,956 SQM which directly relates to the total usable area.

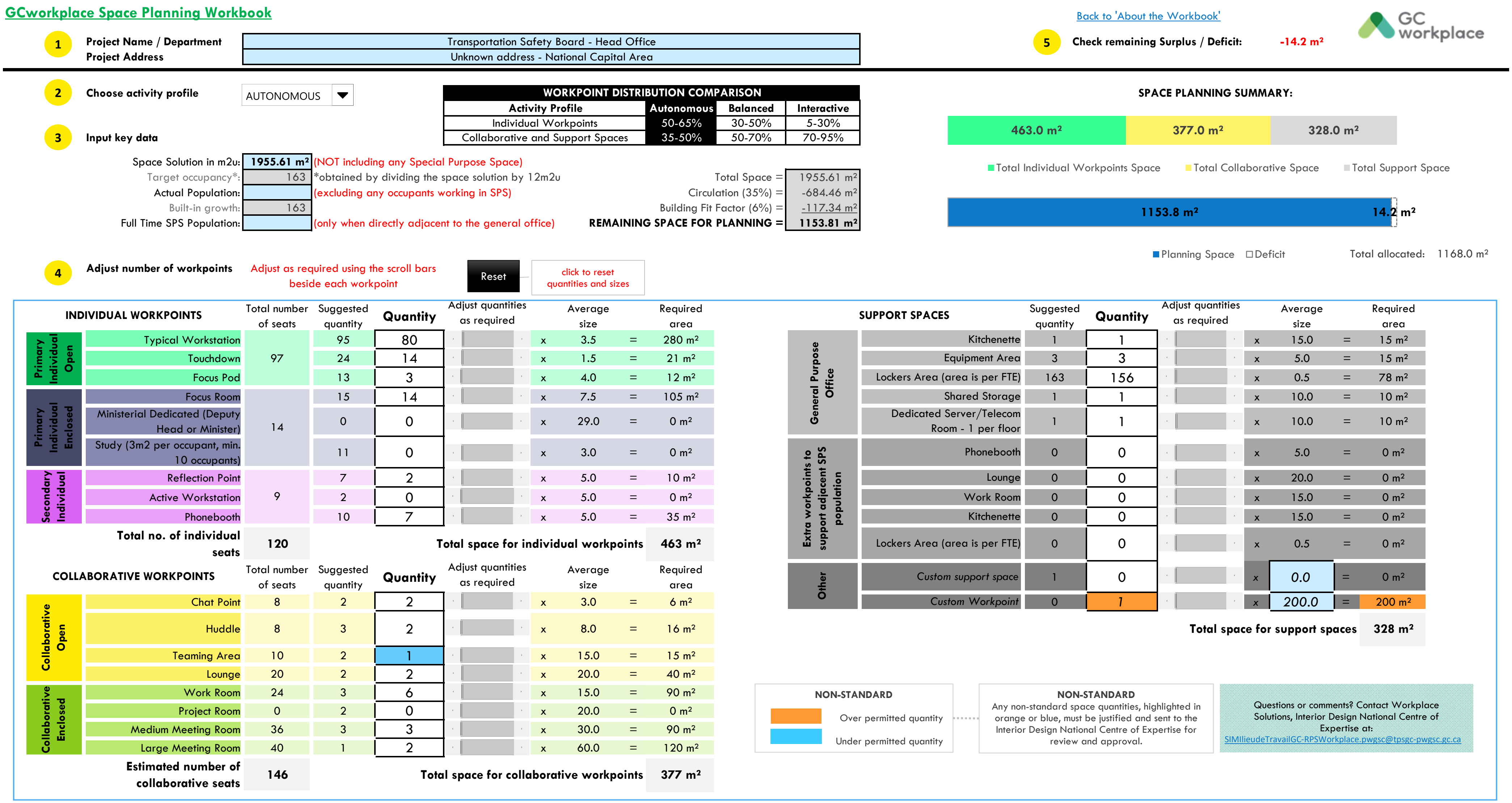


Figure 4.6: GCworkplace Space Planning Workbook

Table 4-8: TSB HO Program Space Requirements

	Room/Space Name	Space Type	Number of spaces	Net Area Functional in SQM	Total Net Area Functional in SQM
CHAIR + BOARD + COO - CUSTOM WORK POINT	Chair (Deputy Minister Equivalent)	Office	1	37.00	37.00
	Chair Washroom	Private Washroom	1	11.00	11.00
	Office of the Chair Meeting Room	Private Meeting Room with waiting area	1	40.00	40.00
	Chair Kitchenette	Private Kitchenette	1	20.00	20.00
	Chair Equipment Area	Private Equipment Area	1	7.50	7.50
	Office COO	Private Enclosed Office	1	18.50	18.50
	Members of Boards Enclosed Office	Private Enclosed Office	4	18.50	74.00
		Sub-Total Chair+Board+COO			**208.00**
INDIVIDUAL	Workstation	Primary Individual Open	80	3.50	280.00
	Touchdown	Primary Individual Open	14	1.50	21.00
	Focus Room[7]	Primary Individual Enclosed	14	7.50	105.00
	Focus Pod	Primary Individual Open	3	4.00	12.00
	Reflection Point	Secondary Individual Open	2	5.00	10.00
	Active Workstation	Secondary Individual Open	0	5.00	0.00
	Phone Booth	Secondary Individual Enclosed	7	5.00	35.00
		Sub-Total Individual Spaces			**463.00**
COLLABORATIVE	Teaming Area	Collaborative Open	1	15.00	15.00
	Lounge[8]	Collaborative Open	2	20.00	40.00
	Workroom	Collaborative Enclosed	6	15.00	90.00
	Project Room	Collaborative Enclosed	0	20.00	0.00
	Medium Meeting Room	Collaborative Enclosed	3	30.00	90.00
	Large Meeting Room[9]	Collaborative Enclosed	2	60.00	120.00
	Chat Point	Collaborative Open	2	3.00	6.00
	Huddle	Collaborative Open	2	8.00	16.00
		Sub-Total Collaborative Spaces			**377.00**
SUPPORT SPACES	Kitchen[10]	Support Space	1	15.00	15.00
	Equipment Area	Support Space	3	5.00	15.00
	Locker Area TSB HO	Support Space	156	0.50	78.00
	Shared Storage	Support Space	1	10.00	10.00
	Telecom	Support Space	1	10.00	10.00
		Sub-Total Support Spaces			**128.00**
SPECIAL PURPOSE SPACE	Records/ Filing	Admin SPS	1	61.00	61.00
	Special Clothing Equipment	Admin SPS	1	29.30	29.30
	IT Equipment	Admin SPS	1	24.80	24.80
	Communication Equipment	Admin SPS	1	11.90	11.90
	Administrative Equipment	Admin SPS	1	19.50	19.50
	Telecom and Server Room[11]	Admin SPS	1	35.00	35.00
	Deployment Kit Storage[12]	Admin SPS	1	22.50	22.50
	Training Equipment Storage[13]	Admin SPS	1	12.00	12.00
		Total Net Area Special Purpose Spaces			**216.00**
		Total Net Area TSB HO			**1,392.00**

[7] Standard size for focus room is 7.5 SQM. Space permitted their size can increase up to 10 SQM maximum during schematic design phase

[8] Lounges are to be located near kitchenettes

4.4.3 TSB HO OFFICE VARIANCE COMPARISON

Table 4-9 demonstrates the variances in net areas for TSB HO office space between the various stages of programming to date. There is approximately a 37% decrease in net TSB HO office area between the original SoR and the Baseline option 100% Functional Program. If further optimization is applied to the program, as outlined in Further optimization option (refer to **Section 11.2**), the net area can be reduced by 46% from the initial SoR submission.

The resulted delta in areas between the SoR and forecasted options are the result of applying the approved GoC GCworkplace Fit–Up Standards to TSTS and the areas allocated for special purpose spaces requirements delineated in the TSB HO SoR.

Table 4-9: Variance in Net Areas for TSB HO Office Space

Space Name	SoR[14] Net Area SQM	MPR - FW Forecast Net Area SQM[15]	66% FPR - FW Forecast Net Area SQM	100% FPR - FW Forecast Baseline Net Area SQM	100% FPR - FW Forecast Further Optimization Net Area SQM
TSB HO					
GCWorkplace - Individual Workspaces	1,955.00	N/A	1,955.00	463.00	347.25
GCWorkplace - Collaboration Work Points				377.00	282.75
GCWorkplace - Support Spaces				128.00	128.00
Executive Suite - Chair, Board Member + COO				208.00	208.00
Special Purpose Spaces	250.00	N/A	250.00	216.00	216.00
Sub-Total TSB HO	**2,205.00**	**N/A**	**2,205.00**	**1,392.00**	**1,182.00**

4.5 PUBLIC SPACE AND SHARED CLIENT SPACE

Under the Laboratories Canada Design Excellence Principle, the design of public spaces is a characteristic that aims to achieve a sense of place built within the building. The traditional definition of public spaces, referred to in our initial discussions as "public realm", includes both exterior and interior spaces accessible to the general public and building occupants. Public spaces provide opportunities for people to come together and engage each other, share ideas, exchange knowledge, and build community. Successful public spaces are inclusive of the diversity of groups present and create meaningful social spaces for everyone to participate in and enjoy. Properly designed, these spaces can be multi-functional and can

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[9] Two large meeting rooms can be reconfigured as one training room when paired side by side with a movable partition in between. When the room is set up as training room, it must be able to support diverse in-person course delivery formats, it must be able to accommodate live distance learning/participation, including blended learning and accommodate concurrent/simultaneous training sessions

[10] TSB HO can locate additional coffee stations throughout the office areas as needed if space permitted.

[11] Telecom and Server Room dedicated for TSB HO only. Server should be located in secure areas of the building not accessible to the public

[12] New SPS created by reducing the area of Records/Filing. Combined with TSTS PPE Storage RDS 056

[13] New SPS created by reducing the area of Records/Filing. Should have immediate adjacency to TSB HO's large meeting room

[14] This SoR was based on the original mandate from TSB HO.

[15] The Master Programming phase did not include the TSB HO scope.

support a wide range of activities, including socialization and business activities, and can also act as overflow spaces for gatherings and events.

Figure 4.7: EEEL, University of Calgary (Calgary, AB)

Well-designed outdoor public spaces contribute to contextualizing a building. It improves the day-to-day user experience, adds value to the area where the project is located, and contributes to the positive experience of others who may never enter the building. In the case of the TSTS Hub and the TSB HO, outdoor spaces such as courtyards/patios, landscape areas, sidewalks, permeable hard surfaces, and vegetation could enhance the building's surroundings while having a positive impact on occupants. These spaces can also be designed to provide amenity spaces for building occupants.

A summary of public space strategies FW has considered is as follows:

- Public spaces are to be accessible to the general public and tenants. They will be near the entrance of the building and immediate nearby areas.
- Outdoor and indoor public spaces will contribute to a sense of place and will allow for impromptu meetings and gatherings to foster a sense of community and inclusion.
- Indoor public spaces will provide the public with access to information about the science programs being conducted on site (e.g., science on display), either through a dedicated space or as part of the circulation space. This opportunity to promote learning will be further explored at the detailed

design stage. The application of the design concept "Science on Display" considers science privacy and security requirements, therefore, opportunities to display science for the general public will occur in public areas such as lobby, reception and interpretative areas. Inside operational zones, the concept can be explored to allow escorted visitors to learn in a greater detailed about the science that is occurring in the facility.

- The zoning of the building will reflect the different degrees of accessibility for the general public, tenants, and special visitors. Appropriate security controls will limit access to various areas within the building. Refer to G1-026 Guide to the Application of Physical Security Zones.

4.5.1 LOBBY PROPER, RECEPTION, AND WAITING AREA

The Lobby Proper, Reception, and Waiting Area is directly connected to the entrance of the building. It includes a reception area, security screening area, and waiting areas. It is meant to welcome and direct tenants and visitors, to control building access, and to provide entrance and exit paths from the building. Since it determines the building's occupants' first impressions, operational considerations should be balanced with design aspirations (see **Figure 4.8**).

Figure 4.8: Charles Library at Temple University, Philadelphia, US

4.5.2 INTERPRETATIVE CENTRE

The Interpretative Centre will be a key welcoming space that showcases TSTS Hub science and significant research happening in the facility. Visual displays and artifacts will educate and engage the public while evoking a strong sense of place and wonder. This space aligns with the Laboratories Canada design goal of science on display.

Figure 4.9: Electra Science Museum London, UK

A list of programmed public spaces (see **Appendix F**) captured the Client's decisions, requirements, and aspirations for the new facility.

4.5.3 GATHERING OF INFORMATION

4.5.3.1 Workshops 5

During Workshop 5, FW presented sustainable site performance strategies. These primarily consisted of recommendations for site selection, site water management, site circulation/active design, and material considerations for exterior use. For site-specific sustainable strategies, see **Section 5.2.**

4.5.3.2 Workshop 6

During Workshop 6, FW introduced the concept of public spaces. This session concentrated on outdoor amenities. Using images of relevant built projects, FW communicated the importance of designing the building form and outdoor public spaces in harmony. Outdoor amenities may include areas for seasonal relaxation, active pedestrian pathways, landscaped areas, and plazas. For site requirements and recommendations, see **Section 7.0**.

4.5.3.3 Workshop 6 – Session 2/Follow up Meeting

The Workshop 6 – Session 2/Follow up Meeting focused on shared client spaces under the TSTS SSoR. FW shown different configurations for a grouping of auditorium, board room, and training room spaces, and provided a test-fit plan for these spaces using an anticipated building occupancy of 250 FTE. Regarding the archive/records/resource centre space, FW showed an archival research library similar that programmed for Cultural Heritage to exemplify this type of space and the support spaces included in it.

During the library discussion, the Client identified this space as a possible synergy between the TSB HO resource centre and the TSTS Hub resource centre. The direction received was to combine the resource centre space components from the TSTS Hub and the TSB HO into a single space, supported by three small satellite resource areas near the science spaces. The intent of the satellite resource zones is to locate the operations and maintenance manuals near their respective equipment.

FW presented three scenarios regarding food services. The first option is an open area/shelled space that will be occupied and operated by a third-party vendor. The second option is a larger-scale operation with a commercial kitchen, retail space, and sitting area operated by a third-party vendor. The third option is a self-serving cafeteria/lunchroom with a dedicated dining area.

4.5.3.4 Workshop 6 – Session 3/Follow up Meeting

The Workshop 6 – Session 3/Follow up Meeting objective was to refine the required and appropriate Public Spaces and Shared Client Spaces for TSTS Hub and TSB HO, and to agree on a strategy for organizing the Public Spaces (i.e., regarding general adjacencies and zoning) in the new facility. FW created a new auditorium type in response to Session 2; renamed the library space to the resource centre, as directed by the Client; and revisited Food Services/Cafeteria Option 3, as described in Session 2.

After sessions 2 and 3 were completed and follow-on discussions with Laboratories Canada, TSTS Hub and TSB HO, the outcomes for Shared Client Spaces were identified. These are described in **Section 4.5.3.5**.

4.5.3.5 Shared Client Spaces Outcomes

Resource Centre

The space labelled Library in the SoR was renamed to the Resource Centre to describe its purpose more accurately. The shared, centralized resource centre will be sized to meet the needs of the TSTS Hub and the TSB HO. Three satellite resource centres will be located near science office spaces (e.g., kitchenettes and lounges). The centralized resource centre will be an archival space. The majority of its space will be dedicated to store manuals and books, and the rest will be used for lounging and reading these materials. This will be a non-staffed space (i.e., no librarian) where users can sign out documents on an honour-system basis.

Figure 4.10: High Density Library System – Courtesy of Bradford Systems

Informal Gathering Space

The informal gathering space will be an open, multi-purpose space where diverse social interactions can take place. These interactions can range from a small group of people chatting to a large-scale, open forum. Events such as town halls and information sessions can be easily accommodated. The informal gathering space is intended to be located near the auditorium preamble space and resource centre. It will provide an additional, flexible area when larger events are occurring in the auditorium.

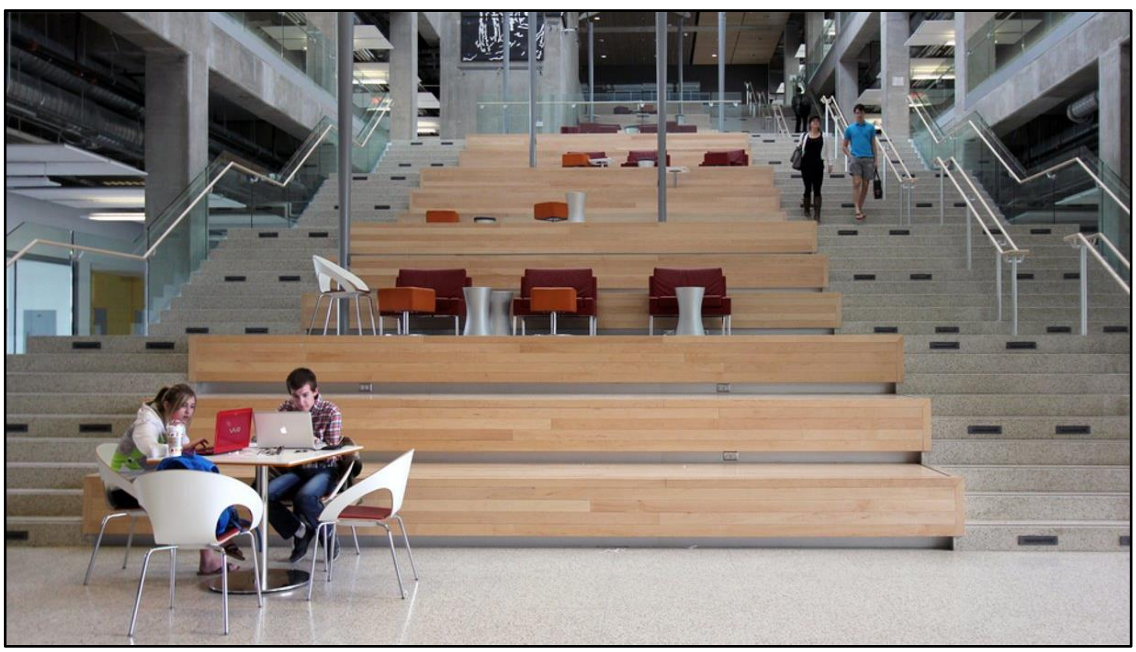


Figure 4.11: EEEL – University of Calgary

Auditorium/ Meeting Rooms

The auditorium will consolidate the advantages of a flat floor and a telescopic seating arrangement into a single multi-purpose space. The space will support both the TSTS Hub occupants during meetings, training sessions, town halls, and other special events (e.g., recruiting and media press conferences, if desired). The auditorium should be located in a zone of the building that is close to the public areas for convenience but its access should be located after the security control area. The space should be designed to accommodate media events such as briefings and press conferences. For the proposed areas and layout, see the RDS in **Appendix E.**

Figure 4.12: Telescoping System – Courtesy of Figueras Group

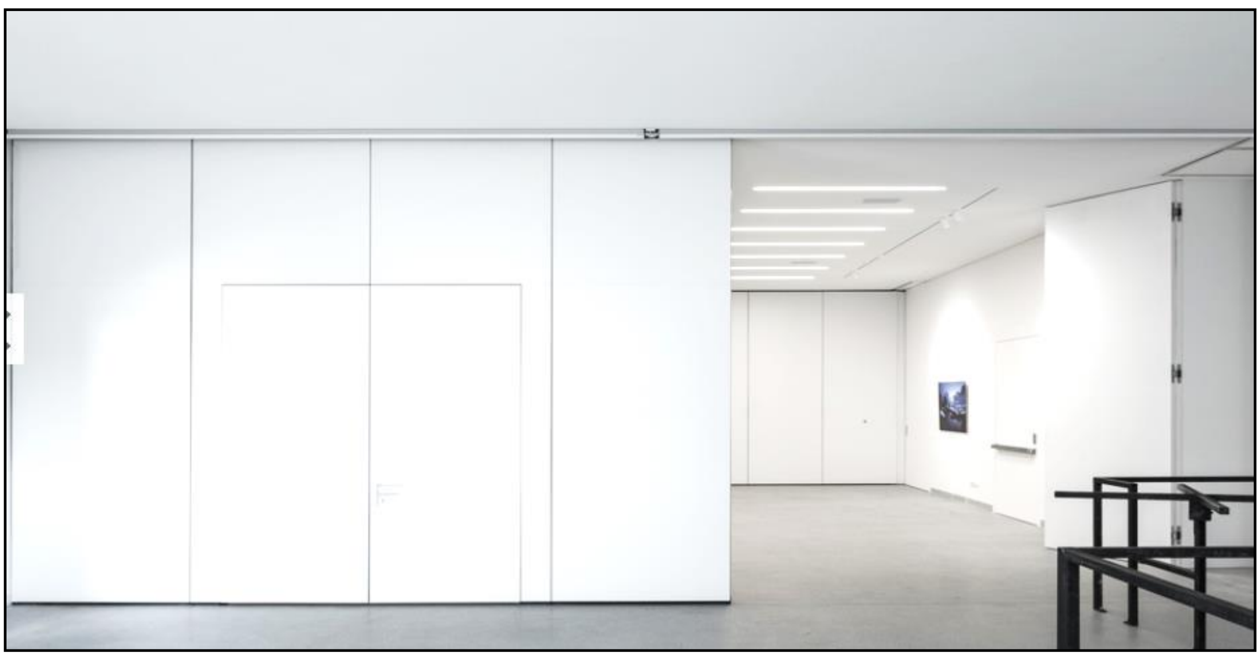


Figure 4.13: Operable Partition Conference Room – Courtesy of Esstfeler Systems

The meeting rooms programmed for the shared building spaces are summarized in **Table 4-10**. These rooms are either dedicated to TSTS Science or TSB HO, or act as shared spaces that may be used by both groups. To optimize flexibility and efficiency of servicing, these rooms should be co-located. In addition to the spaces described in the table below, the Flight Recorder and NVM laboratory suite accommodates two (2) CVR/FDR collaboration rooms which can be shared with nearby science programs at the discretion of TSTS hub.

Table 4-10: Summary Table Meeting/Auditorium Areas

Room Type	Area (NSM)	Seating Capacity	TSB HO (Quantity)	TSTS SCIENCE (Quantity)	Shared Client Space (Quantity)	Total Seating Capacity	Total Area (NSM)
Medium Meeting Room	30	12	3	2	-	60	150.00
Large Meeting Room	60	20	2	2[16]	-	80	240.00
Office of the Chair Meeting Room with waiting area	40	15	1	-	-	15	40.00
Auditorium	235	165	-	-	1	165	235.00
Total			**6**	**4**	**1**	**305**	**665.00**

Food Services

Alternative food services (e.g., cafeterias and coffee shops operated by third party service providers) were explored as part of Functional Programming during Workshop 6. Through consultation, it was agreed that third-party vendor-operated space is not required for this functional program. The 92 SQM area suggested in the SSoR will be divided into a designated 52 SQM lunchroom for TSTS Hub, however, FW recommends that the lunchroom be located in an area accessible to both organizations to foster spontaneous conversations and sharing of ideas. In addition to it, a 20 SQM support kitchenette for TSTS Hub auditorium is provided so that it may function as a servery for meetings or events held in the auditorium and another 19.60 SQM kitchenette for science office accommodation areas. Two (2) additional kitchenettes of approximately 15 SQM each will be included on the TSB HO area.

Table 4-11: Summary Table Food Services Areas

Room Type	Area (NSM)	TSB HO (Quantity)	TSTS SCIENCE (Quantity)	Total Area (NSM)
Lunchroom	52	-	1	52.00
Kitchenette Auditorium	20	-	1	20.00
Kitchenette GCworkplace[17]	15	1	-	15.00
Office of the Chair kitchenette SPS	20	1	-	20.00
Kitchenette Science Office[18] Accommodation TSTS	19.60	-	1	19.60
Total		**1**	**3**	**126.60**

[16] Locate One TSTS large meeting room adjacent to the auditorium. This space can be shared with TSB HO at TSTS's discretion
[17] TSB HO has 1 kitchenette as per GCworkplce space planning workbook. However, space permitted TSB HO could have one or two coffee stations in addition to the kitchenette
[18] Total area (19.60 SQM) could be distributed for one or two kitchenettes depending on building layout

4.5.4 PUBLIC SPACE AND SHARED CLIENT SPACE SUMMARY AREA

Public space and shared client space will be expanded to accommodate the needs of the TSB HO and TSTS Hub groups. FW envisions that those spaces will promote collaboration and casual interactions among TSB HO and TSTS Hub members and visitors. Proposed public and shared client spaces are summarized in **Table 4-12.**

Table 4-12: Public Space and Shared Client Space Area Summary

	Room/Space Name	Number of Spaces	Net Area Functional in SQM	Total Net Area Functional in SQM
BASE BUILDING INFRASTRUCTURE	Entrance/Lobby	1	150	150.00
	Reception	1	25	25.00
	Waiting Area	1	25	25.00
	Security Area	1	35	35.00
PUBLIC ENGAGEMENT	Display - Interpretative Centre	1	25	25.00
	Informal Gathering/Event Space	1	150	150.00
	Universal Accessible Washroom	1	12	12.00
			Total Net Area Public Spaces	**422.00**
SHARED TSTS + TSB HO	Wellness Room/Nursing Room/First Aid	1	24	24.00
	Centralized Resource Centre	1	270	270.00
			Subtotal Shared TSTS + TSB HO	**294.00**
SHARED TSTS	Lunchroom	1	52	52.00
	Auditorium	1	235	235.00
	Storage Room	1	13.2	13.20
	A/V Control Room	1	19	19.00
	Auditorium kitchenette	1	20	20.00
	Decentralized Resource Centre	3	15	45.00
	Server/Computer Room[19]	1	57	57.00
			Subtotal Shared TSTS	**441.20**
			Total Net Area Shared Client Spaces	**735.20**

4.5.5 PUBLIC SPACE AND SHARED CLIENT SPACE VARIANCE COMPARISON

The variances in net areas for public space and shared client space, between the various stages of programming to date, are shown in **Table 4-13.** There is an approximate 18% decrease in net public space and shared client space, between the original SoR and the Baseline option – 100% Functional Program. If further optimization is applied to the program as outlined in Further optimization option (see **Section 11.2**), the net area can be reduced by 25% from the initial SSoR submission.

[19] Server Room for TSTS only. Server should be located in secure areas of the building not accessible to the public. An additional Server and Telecom room is provided for TSB HO forecasted at 35 SQM. Refer to Table 4-8

The 18% decrease in net public and shared client space is the result of downsizing spaces such as the auditorium and resource center to the right scale for TSTS Hub. In addition, new spaces such as the interpretative centre and an informal gathering area were identified as key catalysts to engage the public while displaying sciences. Those spaces were added to the program without exceeding the SSoR net areas.

Table 4-13: Variance in Net Areas for Public Space and Shared Client Space

Space Name		SSoR Net Area SQM	MPR - FW Forecast Net Area SQM	66% FPR - FW Forecast Net Area SQM[20]	100% FPR - FW Forecast Baseline Option Net Area SQM	100% FPR - FW Forecast Further Optimization Option Net Area SQM
Lobby	Public Space	Included in SSoR Grossing Factor	Included in SSoR Grossing Factor	Included in SSoR Grossing Factor	150.00	125.00
Reception /Waiting Area/Security Room/W.C	Public Space				97.00	97.00
Interpretative Centre/Informal Gathering	Public Space	N/A	N/A	N/A	175.00	150.00
Wellness /Nursing /First Aid	TSTS + TSB HO	N/A	N/A	N/A	24.00	12.00
Centralized Resource Centre	TSTS + TSB HO	504.00	504.00	504.00	270.00	270.00
Decentralized Resource Centre	TSTS	N/A	N/A	N/A	45.00	30.00
Lunchroom/Kitchenette Auditorium[21]	TSTS	92.00	92.00	92.00	72.00	52.00
Auditorium	TSTS	769.00	769.00	769.00	267.20	267.20
Server / Computer Room	TSTS	57.00	57.00	57.00	57.00	57.00
Sub-Total Public Spaces and Shared Client Spaces[22]		**1,422.00**	**1,422.00**	**1,422.00**	**1,157.20**	**1,060.20**

4.6 SCIENCE PROGRAM AREA COLLABORATION SUMMARY

The area tabulation for the TSTS Hub is organized by space type and further broken down into individual spaces/rooms. It is a comprehensive area list for all science and non science related spaces in NSM. **Refer to Appendix F** and **Appendix G** for the complete Area Tabulation.

The colours on the area tabulation correlate with the space type. This organization of space types is then grouped so that the grossing factors can be assigned to the type, to quickly calculate total gross areas with a limited order of magnitude. This organization can be used to quickly provide base building costing, since space types should have similar costs per SQM. **Table 4-14** summarizes the area tabulation by space ID and type for Baseline option.

[20] SSoR up to 66% FPR – FW Forecasted Net Area SQM were approved for the TSTS Hub only.
[21] Additional SOA kitchenette (19.60 SQM) area is under lunchroom SSoR allowance. Refer to SOA for details.
[22] Public areas are divided by organization: TSB HO 25% and TSTS Hub 75%

Table 4-14: Area Tabulation by Space ID and Type for Baseline option

Space ID	Room/Space Name	Space Type	Forecasted Area (NSM)	% of Shareable Space
1.0	Itemized list in Appendix G	TSTS Science High Bay Laboratories	2,850.00[23]	20%
2.0	Itemized list in Appendix G	TSTS Science Workshops	888.78	85%
3.0	Itemized list in Appendix G	TSTS Science Laboratories	3,151.94	60%
4.0	Itemized list in Appendix G	TSTS Science Laboratories Support	655.78	40%
5.0	Itemized list in Appendix G	TSTS Science Logistics	162.16	25%
SOA	Itemized list in Appendix N	TSTS Science Office and Support Areas	1,118.32	100%
11.0	Itemized list in Appendix F	TSTS Public Space – 75%	316.50[24]	100%
12.0	Itemized list in Appendix F	TSTS Shared Client Spaces – 75%	551.40[25]	100%

One of the Laboratories Canada design principles is ***Collaboration***. The FW team was conscious of the fact that spaces must be multipurpose and can be shared among the TSTS Hub stakeholders. Excluding the TSB HO area, the sharable science space is anticipated to represent ***57.8%*** of the overall science area.

High Bays: The TSB Engineering Lab and the NRC SMPL each have one distinct high bay area for their respective science-related activities. High bays make up nearly 30% of the science space within the new proposed TSTS Hub facility. The activities performed in high bays may be confidential or have security requirements that limit accessibility. These high bays are not intended to be shared in normal operations. However, following the Laboratories Canada principles of flexibility and collaboration, the TSTS team located the high bays adjacently and requested a moveable partition divider that will allow the maximum permissible width and height of the adjoining high-bay floor spaces to be used in the future.

Workshops: Both the TSB Engineering Lab and the NRC SMPL have workshops in their existing facilities. With the consolidation of their facilities, this science-based workspace will provide the greatest synergies and shareability of spaces. Since this area has increased only slightly in size, it provides the greatest optimization of space within the facility.

Laboratories: Although the area of laboratories increased, the laboratories are consolidated and optimized by science programs. Refer to **Section 2.3** for a detailed description of laboratories synergies. Through the exercise of functional programming, it is anticipated that 60% of the total area of laboratories will be shared by the NRC SMPL and the TSB Engineering Lab. This will result in in operational and workflow efficiencies and new spaces for science collaboration and knowledge sharing.

[23] Although the High Bays will be dedicated to each team, modifications were completed to the RDS to allow for the TSTS Hub to share a swing space within their High Bays.
[24] 75% of the overall public area for the TSTS facility
[25] 75% of the overall shared client areas for TSTS facility

Laboratories Support Spaces: These spaces are directly related to laboratories (e.g., designated equipment rooms). For all sharable laboratories, their associated support space will also be sharable.

Laboratories Logistics: These spaces support operational aspects. The areas that provide synergies include a shared locker space and personal protective equipment (PPE) storage space.

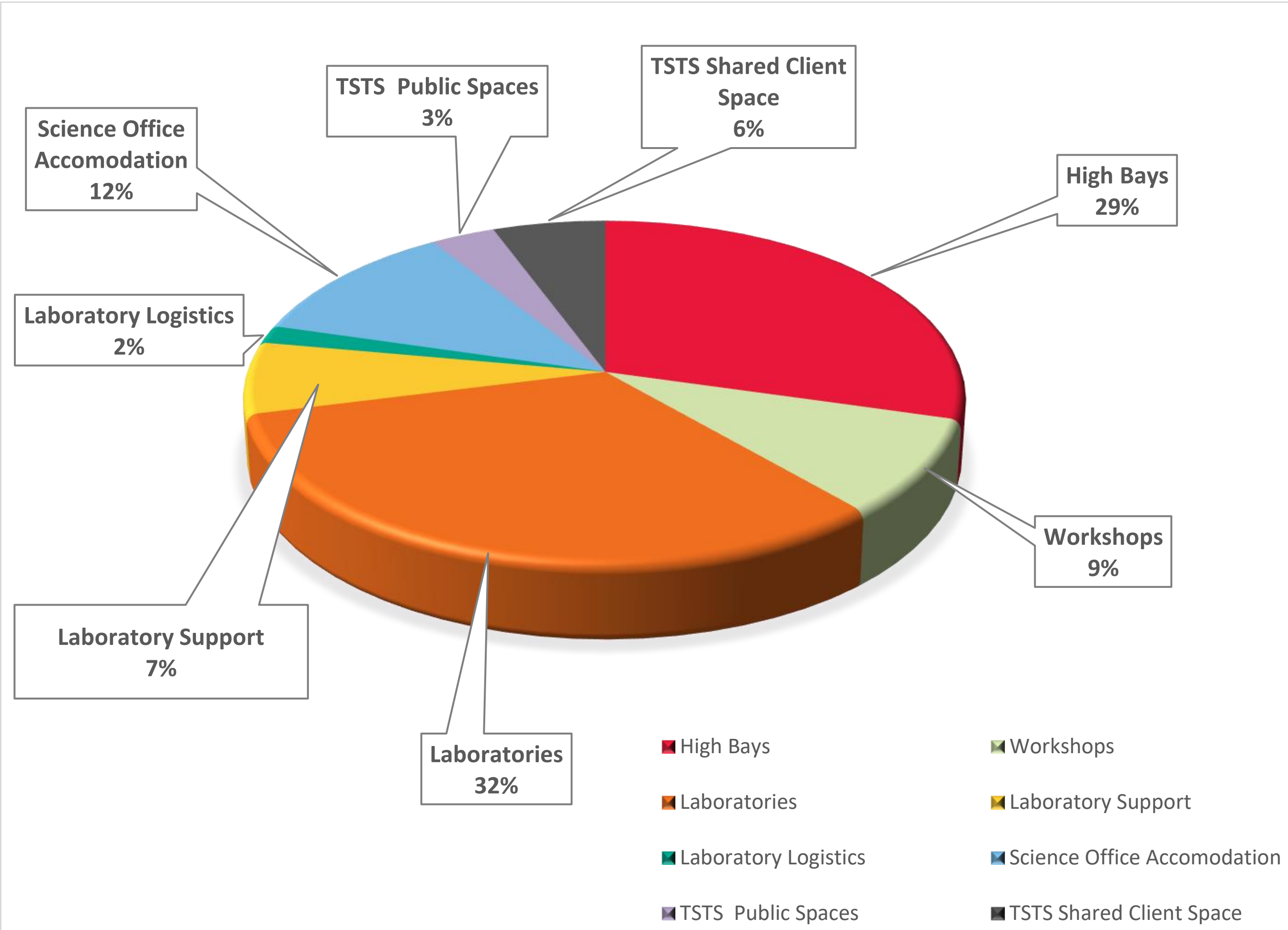


Figure 4.14: Percentage of Total Net Area per Space Type for Science TSTS

5.0 SUSTAINABILITY

Laboratories Canada and PSPC have set an ambitious agenda for environmental sustainability, consistent with the GoC's policies for climate action and environmental preservation. It is proposed that the TSTS Hub facility be designed to be consistent with and symbolic of the governmental policies that establish portfolio-wide approaches to sustainability. These policies include the Federal Sustainable Development Strategy (FSDS 2019-2021), the Greening Government Strategy (2020), and the accompanying Real Property Guidance (2019).

Laboratories Canada Design Principles – Sustainability

Efficient use of energy, water, and material to reduce impacts on the environment through better siting, design, construction, operation, and maintenance throughout the building's life cycle.

Defining Characteristics:

1.0 Design for Net-Zero Carbon and Net-Zero Energy ready

2.0 Provide climate-resiliency in facility life cycle design

3.0 Meets specific health and wellness goals

4.0 Design for high performance operations

5.1 GENERAL SUSTAINABLE STRATEGIES

As part of the pre-design process for the TSTS Hub facility and integration with the development of the in-progress Repeatable Laboratory Design Framework (RLDF), several strategies were identified for a broad investigation and feasibility analysis across different facilities and sites. Generally conceived as good practice in green building design and construction, these strategies are identified in governmental strategy documents or were observed to be characteristic of high-performance laboratory facilities via benchmarking.

5.1.1 FRAMEWORK INTEGRATED DESIGN PROCESS

Achieving extraordinary results requires adopting a design process that is beyond the standard practice. While Net-Zero Carbon and Net-Zero Energy Ready buildings are rapidly becoming the goal for public sector infrastructure projects, project planning must acknowledge that these outcomes represent a significant departure from the design process applied in previous decades. As illustrated in **Figure 5.1**, an Integrated Design Process (IDP) achieves exceptional performance by enhancing collaboration, setting goals, and implementing integrated energy modelling and life cycle costing.

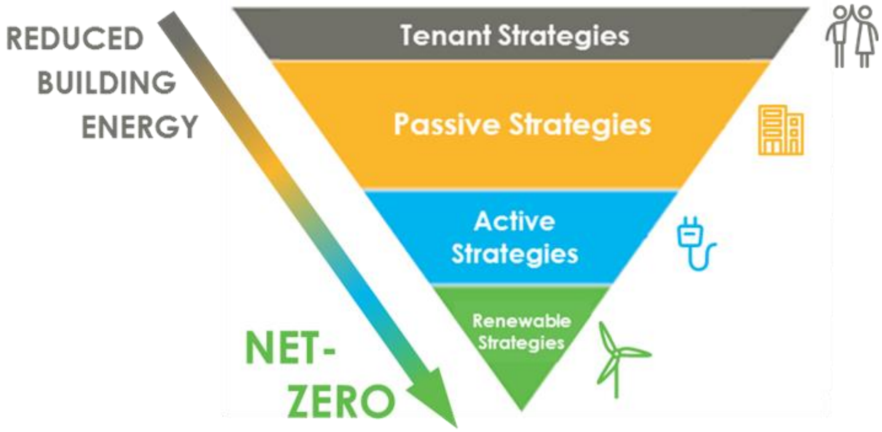


Figure 5.1: IDP Process Diagram (FW)

One characteristic of the IDP is to set goals very early in the design process through extensive collaboration between stakeholders, users, and design team members. These goals are iterated, verified, and adjusted through a series of exploratory workshops and supplemented with analysis of systems and potential outcomes.

One example of such a goal would be to achieve Net-Zero Energy Ready for a laboratory building. Early workshops focus on discussion and verification with stakeholders. Probing questions include:

- Is this goal feasible?
- What solutions would likely contribute and what are the co-benefits and trade-offs?
- Is there an indication of the capital cost impact and return-on-investment for this goal (or solutions that can contribute)?
- How will this goal be tracked and how will progress be reported? What values will inform decision making?

Through the workshop process, the TSTS Hub team started exploring these questions. Early workshops focused on discussions around Net-Zero Carbon: presenting definitions, precedent examples, architectural and engineering solutions, and impact on programming decisions. Subsequent workshops evolved these concepts into practical actions. For example, the Sustainability team engaged with the users and broader design team throughout the RDS review to understand the holistic design. The users and design team were involved in the development of a survey of process plug loads, to allow the design team to go beyond standard assumptions for a non-standard facility. The users were questioned on unique science process plug loads to better inform the energy analysis. The results will be incorporated into the energy model, to estimate the project's performance relative to benchmarks and targets. The annual energy cost estimate helps complete the life cycle cost assessment.

5.1.2 SITE AND TRANSPORTATION

Development of the TSTS Hub site should encourage ecological sustainability, low environmental impact, community wellbeing, and healthy, low-carbon transport.

Parking: Quantity of parking should be appropriately balanced for multi-modal transportation, encouragement of active and low-carbon modes, and futureproofing for ridesharing, autonomy, and transit expansion.

Electric Vehicles (EVs): EVs are becoming increasingly adopted and can now be observed in many locations. They represent an immediate reduction in transport-related emissions. Providing charging equipment on-site is necessary to encourage employee adoption of EVs. Quantity of spaces should be sized for future demand with expandability through providing EV-ready spaces (i.e., with conduit and servicing).

Active Transportation: Building design should appropriately encourage transportation through cycling, walking, running, or any other active mode of transportation. Amenities such as showers, lockers, and secure bicycle racks should meet the desired future modal mix.

Public Transportation: Site design and landscaping should encourage walkability and connection to transit stops. Where site conditions allow, walking to the bus should be more convenient than walking to a personal vehicle.

Landscaping and Planting: Site design should aim to increase the area of softscape and planting to improve the occupant experience, urban area, and local ecology. Local or indigenous plant species should be prioritized to improve habitats and reduce the need for irrigation.

5.1.3 ENERGY AND CARBON STRATEGIES

Siting, massing, and building design should support the target for a Net-Zero Carbon building. Through the IDP, solutions will be sought that reduce loads, lower energy consumption, and reduce operational greenhouse gas (GHG) emissions by switching to low-carbon energy sources.

Construction materials and methods of construction will be chosen with the goal of lowering the embodied carbon of the proposed development. Life cycle assessment can be used to evaluate the options for the massing, assemblies, and materials selection for the enclosure and structure. Low-carbon materials will be prioritized where possible.

Definition of Net-Zero Carbon and Net-Zero Energy Ready

A **Net-Zero Carbon building** is one in which **energy consumption is reduced to a minimum** through building design strategies and efficiency measures, to the point where it will be practical in the **future to use non-carbon-based fuel sources** to meet its energy needs. **Embodied carbon in construction materials must also minimized.**

A **Net-Zero Energy Ready building** is one in which **energy consumption is reduced to a minimum** through building design strategies and efficiency measures, to the point where it will be practical in the **future to use renewable energy generated on-site** to meet its energy needs.

Large buildings often do not have the capacity to generate enough renewable energy on-site to achieve a zero-energy balance (i.e., net-zero, where the building generates renewable energy in an amount that is equal to its own energy consumption annually). This is typically the case for laboratory facilities with a high Energy Use Intensity (EUI) due to large process and ventilation loads. The Greening Government Strategy recommends that these facilities target Net-Zero Carbon—an approach where energy use and GHG emissions are reduced as much as possible on-site. These buildings can then be offset through the generation of renewable energy credits or carbon offsets in other locations.

To achieve the energy performance required to demonstrate Net-Zero Energy Ready, a building would typically need to exceed the National Energy Code of Canada for Buildings (NECB 2017) by 30% or greater (for both energy and carbon).

The energy model is an essential tool in the IDP. It is used to evaluate many potential strategies to optimize the design and achieve the goal of zero carbon. All potential bundles of sustainable strategies need to be assessed against their energy and carbon emission reduction impact, as well as on a life cycle cost basis.

At the functional programming stage, a pre-schematic design energy model is used to estimate energy consumption, as well as carbon and energy costs (see **Figure 5.2**). This model considers coarse dimensions and space layouts, average lighting and plug loads for each major space type, and preliminary HVAC concepts. The level of detail in a functional programming stage energy model is relatively low but includes all categories of energy consumption. Future design stages will build on this energy model, augmenting the level of detail and refining the estimate of energy use and other performance indicators.

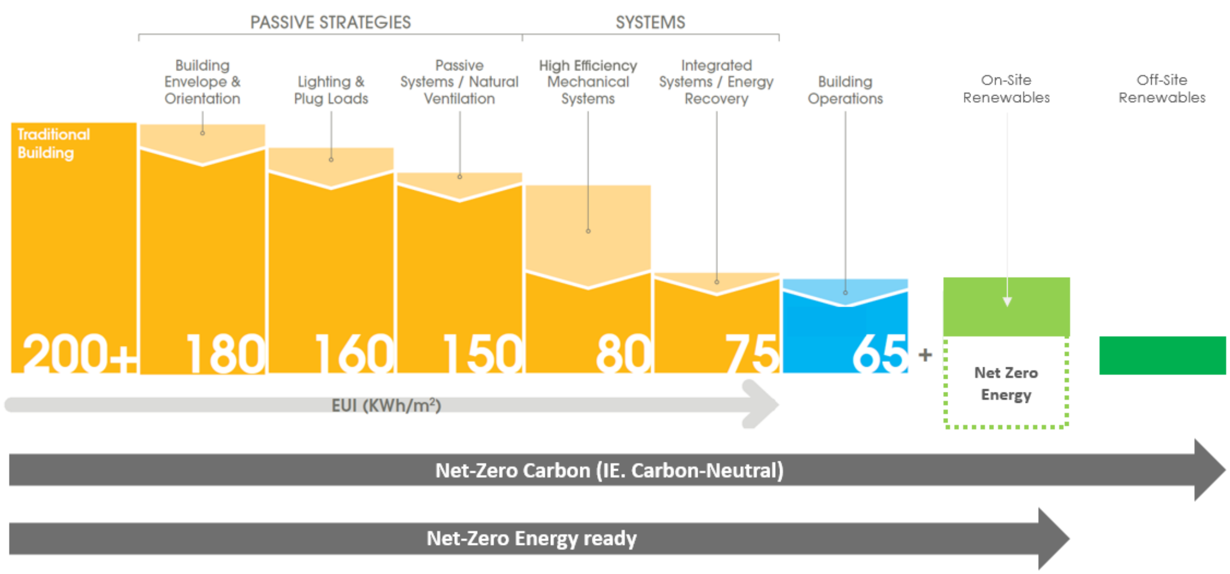


Figure 5.2: Energy and Carbon Optimization Process, Towards Net-Zero Carbon (FW)

The specific measures and solutions chosen to deliver a Net-Zero Carbon design option will be selected based on the local climate, site, program, internal loads, and availability of renewable energy on-site. A Net-Zero Carbon design will be developed by applying the following principles. Strategies that are listed are provided as examples only; at this Functional Programming phase no specific technologies are selected. The strategies described below are typical of laboratory buildings that are targeting Net-Zero

Carbon; however, this facility will be subject to a GHG Options Analysis as a part of the Schematic Design process which will identify specific approaches and technologies.

Tenant Strategies: Engage the user groups to identify simple behavioural changes that can reduce the energy necessary to heat, cool, and light the building. Sample strategies may include the following:

- **Office Equipment:** Set purchasing guidelines for office equipment (e.g., laptops, computers, and Energy-Star labelled equipment) to reduce heat gain and energy consumption.
- **Laboratory Processes:** Select laboratory processes and equipment to reduce off-hours energy consumption and optimize for heating/cooling energy and heat recovery. Connect dedicated heating / cooling loops for process equipment to building central systems to maximize heat recovery.
- **Lighting Controllability:** Provide task lighting for workspaces and lab benches to facilitate user control and reduce overhead lighting requirements.
- **Engagement and Behavioural Adjustment:** Implement change management and user training for initiatives such as operable windows in offices and expanded heating and cooling set points to save HVAC energy.

Passive Strategies: Reduce the energy needed to meet user needs for heating, cooling, and lighting through better selection of siting, form and massing, daylighting, and building envelope construction. Sample strategies may include the following:

- **Site Selection:** Some locations will contribute to a lower EUI through the availability of renewable energy, daylight, and options for efficient heat exchange (e.g., geoexchange or deep-river cooling).
- **Building Positioning:** Access to abundant solar energy will improve the range of options for energy generation (through photovoltaics or solar pre-heat) or daylighting. Solar heat gains should also be considered for impact in summer/winter operating modes.
- **Positioning of Glazing:** North- and south-facing apertures tend to provide the best daylight for interior zones, while east- and west-facing apertures may introduce sun angles that result in difficult-to-control glare and solar gains. Sizing of apertures must be balanced between occupant views, porosity and security, access to daylight, and thermal energy efficiency.
- **Thermal Performance of Envelope Assemblies:** High performance buildings will typically employ assemblies and details that far exceed the minimum code requirements for thermal performance. Measures such as increased insulation, triple-pane windows, and increased thermal breaks should be evaluated at the site-specific level, with integrated energy and costing analysis.

Active Strategies: Building systems that consume energy should be designed to be as efficient as possible. Sample strategies may include the following:

- **Efficient, High-Performance Lighting:** High-efficiency lighting fixtures provide required lighting levels while reducing power consumption and heat gains.
- **High-Performance HVAC Systems:** Laboratories and workspaces should be addressed with distinct systems that are appropriately selected to match space needs for heating, cooling, ventilation, and redundancy. Dedicated outdoor air systems (DOAS) should be used to meet ventilation needs separate from heating and cooling loads. Air-side energy recovery (or pre-heat) should be used to reduce ventilation loads.

- **Low-Carbon Heating and Cooling Plants:** Central plant equipment should be as efficient as possible, with variable-flow systems sized appropriately for the anticipated loads. Systems such as water-to-water heat pumps and ground source loops are to be explored to maximize heat recovery and efficiency. When selecting plant equipment, consider the GHG emissions factor for the local energy sources. Fossil fuel combustion for space heating will not be pursued.
- **Controls Strategies:** Automated controls should be used to monitor environmental conditions and adjust systems operation where possible, to meet occupant needs while metering energy consumption. Occupancy/vacancy sensors, temperature sensors, and daylight sensors will be used to adjust HVAC and lighting equipment. Energy metering equipment will be provided to monitor consumption and support high-performance operations.
- **Lab Ventilation Strategies:** Strategies should be considered that are specific to laboratory ventilation systems and controls. These will be evaluated individually, based on the characteristics of the facility and the lab spaces as appropriate. Some possible strategies include:
  - High performance fume hoods with occupancy sensors and sash alarms
  - Air sampling systems to reduce the air change rates within a laboratory space when there is little to no detection of contaminants
  - Cascade supply air from non-laboratory spaces to laboratory spaces
  - High plume variable volume exhaust fans complete with wind anemometers to lower fan energy
  - Heat recovery on all laboratory exhaust systems with full flow bypass dampers
  - Additional ventilation strategies on a project-specific, integrated Laboratory Safety, Sustainability and Ventilation Management Strategy

Renewable Energy Strategies: Generating renewable energy on-site is a key strategy to demonstrate environmental leadership and reduce the GHG and air pollutant emissions associated with electricity generated from non-renewable sources. Renewable energy opportunities will be highly site-dependent, but sample strategies may include the following:

- **Photovoltaic (PV) Panels:** Photovoltaic PV panels are a proven technology to generate clean energy on-site. PV panels can be mounted on roof surfaces or alternately can be evaluated for installation at ground-level in select locations (for example, covering surface parking spaces).
- Building Integrated PV: Utilize building surfaces such as cladding, glazing, and canopies to provide space for additional PV panels.
- **Solar Air Heaters:** A transpired solar collector can be incorporated into roof or cladding to absorb solar energy and provide pre-heating for ventilation air.
- **Wind Turbines:** Wind power can also be investigated as an option for the site. Although wind velocity in NCA is understood to be low for utility-scale turbines; micro-turbines may provide a better demonstration of wind energy on-site.
- **Energy Storage:** Storage of energy on-site (by battery system, flywheel, or hydrogen fuel cell for example) provides a demonstration of innovative energy systems and resiliency for any grid outages.

5.1.3.1 Laboratory Safety, Sustainability, and Ventilation Strategy

One of the primary drivers of high energy use in laboratory buildings is the high volume of ventilation that is delivered to laboratory spaces. Delivering high volumes of outdoor air helps remove pollutants to provide a required level of occupant safety. However, higher ventilation air volumes increase both fan energy use and heating/cooling energy used to condition outdoor air. This impedes sustainability performance. The inverse is also true.

Implementing strategies to properly ventilation systems and air flow rates to laboratory spaces is one of the most important strategies to optimize sustainability and energy efficiency of laboratory buildings. Occupant must not be compromised; however, it is usually possible to reduce ventilation volumes and air change rates substantially from the standard values historically applied while maintaining occupant safety. A review of literature dedicated to high-performance sustainable laboratory buildings (i.e., technical guidelines and case study profiles) showed that implementing an integrated Laboratory Safety, Sustainability, and Ventilation Strategy allows most projects to optimize energy performance.

The integrated Laboratory Safety, Sustainability, and Ventilation Strategy for the TSTS Hub must be developed iteratively throughout phases of the project delivery. As progressively better information becomes available regarding the presence of hazards, occupant requirements, thermal loads, and mechanical systems applied, ventilation strategies and energy consumption can be optimized effectively. At the functional programming stage, the space volumes, ventilation air volumes, thermal loads, and detailed information on space requirements are not yet known; therefore, energy analysis will focus on benchmarking and sensitivity analysis around ventilation volumes at the whole-building level or AHU (air-handling unit) system level. Analysis related to zone ventilation rates will focus on the initial description of user requirements and the presence of hazards that may drive requirements for air change rates and velocities. A description of this process at the Functional Programming stage can be found in **Section 9.2**.

5.1.4 WATER REDUCTION STRATEGIES

Building systems and plumbing should be designed to treat fresh water as a scarce resource (i.e., efficiently) using potable water. The site should be designed holistically to reduce the consumption of potable water indoors, encourage water efficiency in laboratory processes, and encourage a green infrastructure approach to site development that demonstrates water being used sustainably.

Specific strategies are addressed at the site-specific level. Generally, the following strategies would be included:

Low-Flow Fixtures: Specify low-flow plumbing fixtures (e.g., water closets, urinals, lavatory faucets, kitchen faucets, and showers) to limit water use in the building.

Rainwater Reuse: Reuse rainwater collected from roof runoff in the building where appropriate, to flush toilets and urinals. Runoff from the roof or the site area can be collected and reused for irrigation.

Irrigation: Reduce the need for irrigation by preferentially selecting native, indigenous plant species. Only irrigate the landscape with captured rainwater or greywater.

Stormwater Management: Develop the site for the maximum quantity of stormwater to be treated on-site, using natural processes designed to mimic the natural hydrology from pre-development conditions. Maximize opportunities to incorporate green infrastructure (e.g., swales, retention ponds, and rain gardens).

5.1.5 HEALTH AND WELLNESS STRATEGIES

Development of the project site and building should encourage occupant health and wellness via physical activity and the quality of the indoor environment.

Ventilation and Air Quality: Provide a safe and healthy workplace by adhering to codes and standards that stipulate the minimum requirements for ventilation and filtration of outdoor air. Consider increasing ventilation volume to workspaces, to encourage increased focus and productivity. Explore mixed-mode natural ventilation strategies, where appropriate for the climate and space type. Materials and finishes should be selected to minimize emissions of volatile organic compounds (VOCs) and to enable high indoor air quality (IAQ).

Lighting Quality: Provide lighting levels that meet appropriate standards for workspace and function. Supplement overhead lighting with local task lighting to provide enhanced controllability. Explore tunable lighting for workspaces, to reinforce natural circadian rhythms and improve sleep quality.

Access to Views: Provide access to views of the exterior, and ideally provide all workspaces with line-of-sight to vegetated spaces or the urban environment. Consider using atrium spaces to provide views for interior zones.

Circulation and Active Design: Plan interior spaces to encourage physical movement, circulation, and low-intensity exercise. For multi-storey structures, emphasize the presence of stairways to make them more prominent and preferable to elevators. Use artwork and graphic design to enhance circulation spaces and encourage movement.

Encourage Active Transportation: Provide amenities as described in **Section 5.1.2.**

Biophilic Design: Design interior spaces to replicate the natural forms, patterns, and textures of nature where appropriate, to evoke a natural environment and enhance concentration, focus, satisfaction, and productivity.

Provide Allowance for Wellness and Activity Spaces: Consider providing spaces that further encourage occupant relaxation (e.g., wellness rooms, prayer rooms, and lactation rooms). Consider providing spaces that further encourage occupant activity (e.g., exterior fitness spaces or walking trails).

Provide Allowance for Healthy Food: Provide refrigerated storage for employees' food and ensure that kitchen/dining spaces are cleaned regularly. If healthy food options are not available in the area, consider providing a program for healthy foods to encourage good nutrition and informal gathering. Provide clean drinking water close to workspaces and in dining areas.

5.1.6 MATERIALS AND RESOURCES STRATEGIES

Planning for detailed design and construction should consider the impact of material supply chain. Choose materials that promote environmental and social sustainability.

Waste management strategies should be implemented to be consistent with the latest version of the TBS Greening Government Strategy and the associated guidance for real property.

Construction, Renovation, and Demolition (CRD) Waste: Implement a comprehensive Construction Waste Management (CWM) Plan and target a waste diversion rate of at least 90%. Have official CWM records verified by a third party to ensure transparency. Follow guidance established in the LEED v4 prerequisite and credit for CWM.

Operational Waste: Develop operational policies and procedures to achieve at least 75% diversion rates by weight of all non-hazardous operational waste. During the detailed design stage, identify the infrastructure and planning principles necessary to facilitate a high level of reuse, recycling, and source separation of materials.

Local Materials: Where possible, specify materials that can be procured locally.

Low Emitting Materials: VOCs are a source of IAQ contaminants. Specify products that have no or low VOCs.

Chemical Storage: Provide safe storage for chemicals and adequate exhaust to ensure the IAQ in occupied spaces is not adversely affected by the chemical storage.

Hazardous Waste: Provide adequate space to safely dispose of hazardous waste.

Material Use and Embodied Carbon: Evaluate the environmental impact of materials used in the construction of the facility, including the impact across all life cycles as defined through the Life Cycle Assessment (LCA). All projects must minimize embodied carbon used in building materials.

5.2 SITE-SPECIFIC SUSTAINABLE STRATEGIES

After completing the early-stage analysis, six strategies were identified as specifically applicable to the TSTS Hub facility and are proposed for further analysis as the pre-design process progresses. These strategies are identified in the following sections.

5.2.1 SITE AND TRANSPORTATION

Workshop 4 focused on-site design considerations. The following site-specific sustainability considerations were presented:

- Consider building location, orientation, and aspect ratio to maximize potential renewable energy sources (i.e., solar and/or wind) and to facilitate daylighting, natural ventilation, and solar shading opportunities for maximum indoor wellbeing.
- Design site layout to facilitate geoexchange boreholes and piping.
- Support low carbon transportation and infrastructure via visibility and access to public transit and consideration of current and future (i.e., 100% electric ready) EV charging needs.
- Include outdoor areas for seasonal relaxation, breaks, and light exercise. Spaces should accommodate both pedestrians and cyclists during all four seasons.
- Select site materials with low embodied energy (including local or indigenous materials), permeability to water, and the ability to mitigate urban heat island effects.
- Design the site to consider 100% on-site stormwater management with green infrastructure (e.g., bioswales).

- Augment the visibility of sustainable initiatives and science processes to communicate the successes of the project.

5.2.2 ENERGY AND CARBON STRATEGIES

Concepts surrounding Net-Zero Carbon and energy efficiency were explored with the TSTS Hub during Workshop 1 and Workshop 2.

The TSTS Hub facility will be located at the NRC Montreal Road Campus. Within the NCR and Ontario, electricity supplied from the grid is typically generated from nuclear, hydro, and natural gas, with a small fraction of renewables generated from wind and solar. Electricity in Ontario is relatively clean compared to the national average. Since the carbon footprint for one megawatt hour (MWH) of energy from electricity is significantly less than for one MWH of natural gas, it is preferable to use electricity as a fuel (see **Figure 5.3**).

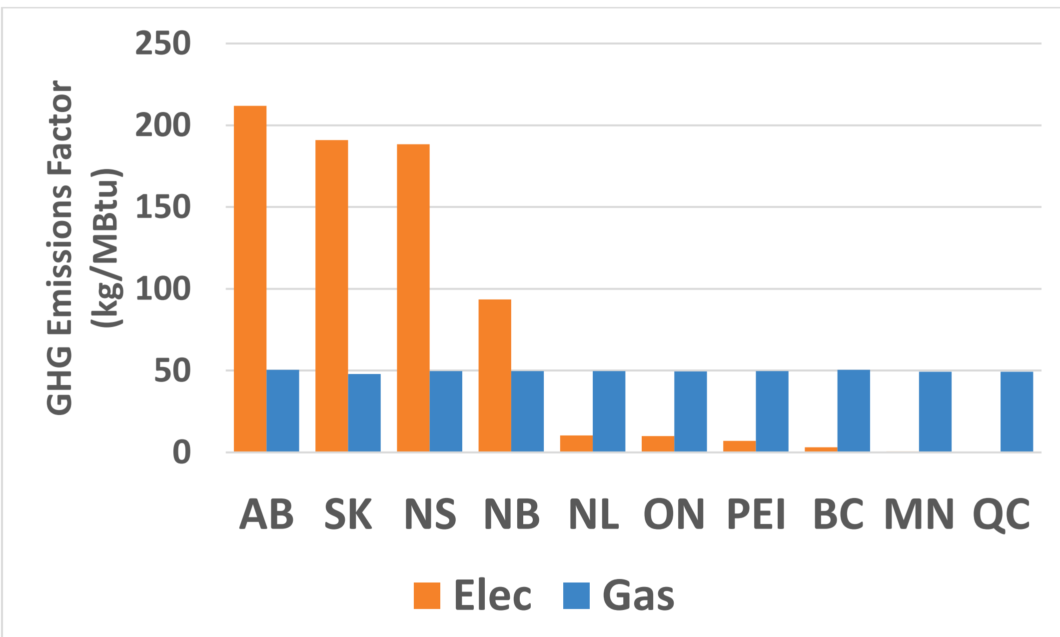


Figure 5.3: Carbon Emissions per MWH for Electricity and Natural Gas in Canada by Province

It is understood that as part of the Treasury Board of Canada Secretariat's Greening Government Strategy (GGS) includes a commitment to "using 100% clean electricity by 2022, where available, and by 2025, at the latest, by producing or purchasing renewable electricity". Off-site renewable electricity purchases may take the form of new Renewable Energy Certificates (RECs) or Power Purchase Agreements (PPAs) in denominations of units of electricity.

The use of green power products such as RECs or PPAs will allow Labs Canada and PSPC to effectively claim that its buildings are supplied by green energy', if the green power products are purchased in such quantity that they offset 100% of building energy use. The purchase of green power products would effectively offset Labs Canada's Scope 2 GHG emissions from each facility.

This report will calculate GHG emissions from building operations and science-related emissions according to the current emissions factors calculated for Ontario. It is understood that when the GoC enters into a portfolio-wide agreement to purchase green power for 100% of its electricity use, this would effectively offset Scope 2 GHG emissions and provide 'zero-carbon' electricity.

During the first two workshops, FW explored comparable benchmarks for North American facilities that have achieved Net-Zero Carbon and/or award-winning performance. The following key points were discussed:

- Energy use for laboratory buildings is highly dependent on process loads (i.e., the laboratory processes that drive high demand for fossil fuel, heat energy, ventilation, and electricity).
- Appropriate measures to reduce energy use depend on identifying and understanding the drivers of these loads and how they may change in future years.
- Equipment lists should be developed to account not only for physical size and power needs but for duty cycle, run hours, and other information that will help identify high energy users and inform energy simulations and target setting.
- The shape and orientation of a building will consider adjacencies and co-located/shared spaces, while striving to maximize daylight penetration and passive solar gains. Clerestory or sawtooth glazing was agreed upon to be desirable for workspaces and atrium spaces.
- Net-Zero Carbon laboratory buildings deploy renewable energy on-site to address loads (i.e., solar pre-heat) or generate electricity (i.e., solar PV). To achieve Net-Zero Carbon, the entire roof should be regarded as a surface for PV, pending review of site conditions. Renewable energy is not only an energy measure but an opportunity to demonstrate leadership in sustainability.
- Net-Zero Carbon facilities are recyclers of energy that maximize the opportunity to harvest waste heat and reduce the need for heating/cooling energy consumption at a central plant. Ground source and/or air source heat pumps are common measures that will be explored, pending review of site conditions.
- Optimized, dynamic ventilation strategy should be evaluated in consideration with Laboratory Safety, Sustainability, and Ventilation Strategy to minimize ventilation loads. This will be investigated later in the design process.
- Measures to reduce embodied carbon of construction materials are less commonly understood in precedents and literature; however, the use of mass timber structure for office spaces and lobby/feature spaces is a measure that has been favourably received.

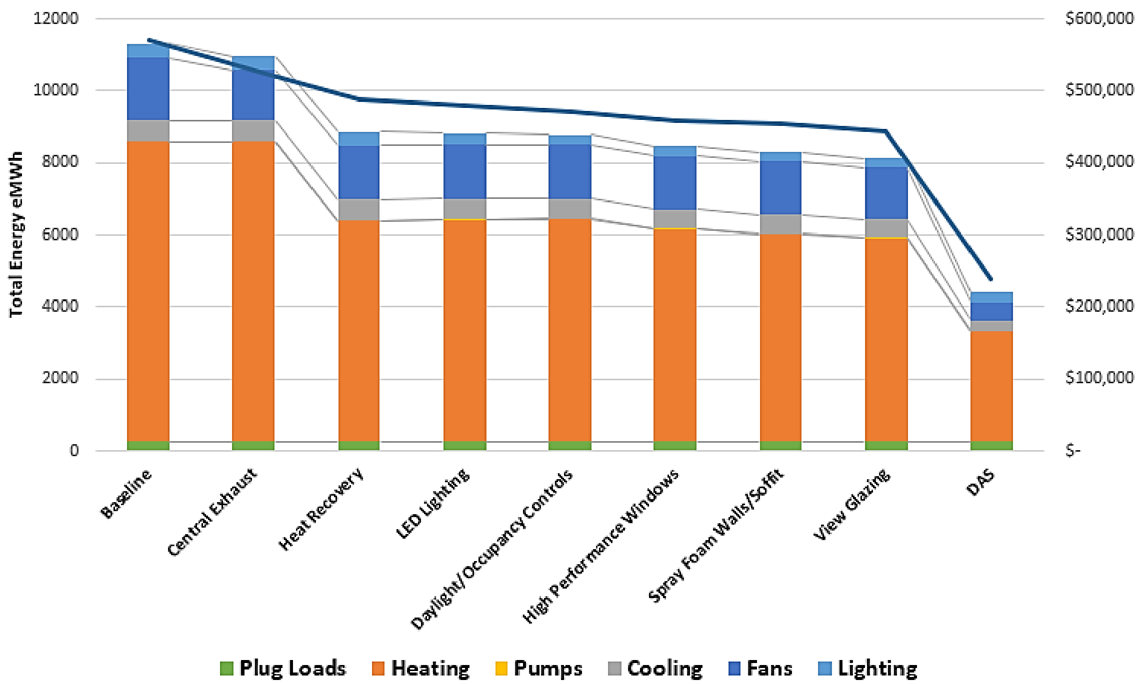


Figure 5.4: Example of Energy Optimization through Several Measures, CCIW Laboratories (Burlington, ON) (FW)

This section of this Functional Programming Report will discuss some proposed strategies and estimated energy modeling results, at a high level. These strategies are discussed because they are typical of high-performance laboratories and high-performance buildings achieving Net-Zero Carbon in cold climates. These systems and solutions do not represent a design, or a proposed direction for Schematic Design. That phase will follow after completion of Functional Programming and Site Options Analysis. Specifically, the selection of parameters for building envelope performance, central heating and cooling plant, lighting, HVAC delivery, and other measures should by done by performing a GHG Options Analysis according to the PSPC Guideline - Project GHG Options Analysis Methodology. For this Lifecycle Costing Analysis (LCCA) exercise, a study length of 40 years should be applied. GHG emissions should be costed at $300 per tonne consistently across the study period.

5.2.2.1 Building Energy Modelling

Building on the benchmarking completed earlier for the TSTS Hub, a whole building energy model was created to estimate operating carbon emissions and energy use. This pre-schematic design model, though relatively coarse, provides a preliminary look at the building's performance relative to benchmarks and Net-Zero Carbon goals. Energy uses in the TSTS Hub facility can be broadly categorized into two types: building system related energy and process-plug energy.

Building system related energy has to do with the design, construction, and specification of the building. This includes the size and dimensions; building envelope; and HVAC, electrical, and other systems. The optimization of building systems begins with high-performance recommendations that are typical of

Net-Zero Carbon building design. When more detail becomes available at a future stage regarding the design, these systems will be optimized with the help of the building energy model.

Process/plug energy is unique to the science process housed within the building. Process/plug loads vary greatly between projects. Industry standard assumptions and defaults are effective for some building and occupancy types but not others. Laboratory buildings are not well suited to these standard assumptions. A three-part approach to estimating process/plug loads is detailed in **Section 5.2.2.2.**

Building energy modelling was used at the functional programming stage to estimate the project's performance relative to its sustainability goals.

The energy model was used to determine high-level estimates of annual energy use, operating GHG emissions, and thermal energy demand intensity (TEDI). The renewable energy generation requirement to achieve Net-Zero Carbon was also estimated. Estimates of annual energy cost were determined to fully inform the life cycle cost analysis.

The preliminary energy model developed for the new TSTS Hub demonstrates the potential for a high-performance laboratory with superior energy efficiency and reduced GHG emissions, consistent with Laboratories Canada design principle for Sustainability. The modelled EUI of 314 kWh/SQM/yr is 37% lower than the existing facility's average EUI of 501 kWh/SQM/yr. This places it among the highest tiers of the I2SL benchmarking data set. Similarly, the total modelled annual GHG emissions is approximately 233 tonnes of CO_2e, which translates to an emissions intensity of 11.1 kg of CO_2e/SQM. This is significantly lower than other facilities in the I2SL database.

However, the facility is energy-intensive in absolute terms. Science-based process loads are estimated to account for 53% of annual energy use and 73% of annual GHG emissions. As such, understanding and managing these loads will be essential to meet the energy and carbon performance targets. The operating assumptions associated with the major science-based process loads should be continually verified with the user groups as the project proceeds towards schematic design and beyond.

Energy consumption associated with the building systems is minimized via a combination of passive load reduction measures and active energy efficiency measures (e.g., heat recovery and demand-controlled ventilation to reduce energy usage). GHG emissions are reduced via electrification and fuel switching strategies to avoid fossil-fuel based combustion.

A preliminary on-site renewable energy generation assessment indicated that rooftop PV has the potential to offset 34% of annual energy use and 19% of annual GHG emissions. To achieve a Net-Zero Carbon balance would require the contribution of 88 000 SQM of off-site solar. As reported in **Section 5.2.2** above, it is understood that this will be accomplished at the portfolio level via purchase of RECs or PPAs.

The energy models developed during the functional programming phase will be further refined and used to evaluate multiple test-fit and massing options. Energy modelling should be used iteratively as a decision-making tool throughout the design process, to optimize the key design parameters that will influence the energy and carbon performance of the facility.

Refer to **Appendix K – Energy Modeling Report** for details regarding the key modelling inputs and assumptions, the analysis methodology, and the outputs associated with key building performance metrics.

5.2.2.2 Process-Plug Load Analysis

Three categories of process-plug loads were identified:

1. Unique science process loads
2. Common space types that represent a large building area (e.g., office and general lab)
3. All other spaces

UNIQUE SCIENCE PROCESS LOADS

The design team generated a questionnaire to solicit detailed information regarding major science process loads. The questionnaire was reviewed by the broader design team and shared with the TSTS Hub for comment during Workshop 5. To ease completion, the design team pre-populated the questionnaire with known information, leaving only the areas of uncertainty for the users to complete.

The following list of unique, energy-intense equipment was identified and shared with the TSTS Hub for comment during Workshop 5. It was updated based on subsequent commentary from NRC SMPL.

1. Spin Rig
2. Burner Rig 1
3. Burner Rig 2
4. Hydraulic power plant (serving process equipment)
5. Central compressed air plant(s)
6. Central process cooling plant
7. M13 high temperature inductors
   a. Radiation furnaces
   b. Hot isostatic press
   c. Vacuum furnace
8. M17 furnaces:
   a. Isostatic press
   b. Vacuum press
   c. Radiation furnaces
   d. Cyclic oxidation equipment

COMMON SPACE TYPES

The second important category of process-plug load is that of common space types (e.g., offices and general lab areas). Since these areas are large, they warrant additional investigation to compare industry-standard assumptions with facility-specific data. This involves questioning the type and density of office equipment. It also includes understanding the plug loads in an average lab area, where there may be many small pieces of energy-consuming equipment. The results of this investigation will be an average process plug load density applied to common space areas in the building energy model.

ALL OTHER SPACES

All other spaces will be treated with industry default plug load densities.

5.2.2.3 Energy and Carbon Inputs into Life Cycle Cost Evaluation

The scope of work for the functional programming phase includes providing cost estimates based on Life Cycle Cost Evaluation. These cost estimates should include capital and operating costs for the TSTS Hub.

Determining the future costs for energy and the associated cost of carbon is an important part of this costing exercise. Incorporating energy efficiency strategies and targeting zero carbon performance will reduce the annual operating expenditure for the TSTS Hub and contribute to a facility that is future-proofed and that will require fewer capital projects to remain modern and competitive over its 40-year life cycle.

Table 5-1 provides information on the proposed parameters for the life cycle costing related to energy and carbon.

Table 5-1: Life Cycle Costing Parameters

Parameter	Recommended Value	Rationale
Capital Cost, Year Zero	$195,218,000 CAD	As reported in the Class D Costing, 18 December 2020.
Year 1 Energy Consumption	Electricity: 6165 MWh Jet Fuel: 456 MWh	As reported in the energy model report
Year 1 Energy Cost Rates	Electricity: $0.114/kWh Jet Fuel: $0.083/kWh	As reported in the energy model report
Shadow Price for Operating GHG Emissions	$300 per ton, fixed over project life cycle	As per GHG Options Analysis Methodology, November 2020
Escalation Rate, Electricity	3.00%	To be confirmed with the PSPC Finance and Administration Branch (FAB)
Discount Rate	2.526%	To be confirmed with the PSPC Finance and Administration Branch (FAB)

The following uses were not calculated and therefore excluded from the life cycle cost estimate, or were captured in operations cost estimates based on a comparable $/SQM:

- Natural gas for building heating and domestic hot water (DHW (assumed to be zero, as the facility is planned to be zero-combustion for building systems)
- Natural gas and other fuels for science-related processes (with the exception of jet fuel usage for the burner rig)
- Potable water for plumbing
- Potable water for science-related processes

5.2.3 WATER REDUCTION STRATEGIES

Site-specific water reduction strategies were introduced to the user groups via the integrated workshops. These familiarized the user groups with measures that will likely be pursued to achieve water efficiency and evaluated probable areas for water savings in the detailed design. Identifying specific water strategies will advance during the schematic design phase, following the formalization of site selection. Strategies that have been introduced include the following.

Low-flow Plumbing Fixtures: Water efficiency for washrooms, kitchens, and showers will be pursued using low-flow fixtures. Flow rates will be proposed during detailed design; however, fixtures must be water-efficient based on industry benchmarks such as WaterSense and the LEED v4 prerequisite and credit for Indoor Water Use. The following examples of fixture flow rates were presented and discussed at the integrated workshops:

- 4.8 litre per flush (LPF) toilets
- 0.5 LPF urinals
- 1.9 litre per minute (LPM) lavatory faucets
- 5.7 LPM showers
- 5.7 LPM kitchen sinks

Rainwater Reuse: A frequently adopted green building strategy is to capture run-off from roof surfaces to be stored, treated, and reused on-site. This measure could greatly reduce potable water use in the facility. During the functional programming process, the consultant team clarified that although rainwater capture and reuse are being investigated, this system would only be used for connection to flush fixtures (i.e., water closets or urinals) or for irrigation. Potable water will be used for all flow fixtures (i.e., faucets and showers). The use of non-potable water for any laboratory processes and the treatment and reuse of grey water should be reviewed during detailed design by the consultant team.

Advanced Water Metering: A smart meter should be incorporated to measure potable water consumption at the building level. The use of additional smart meters to track water consumption of specific uses and subsystems, including captured rainwater, indoor plumbing to washrooms and showers, make-up for cooling towers and boilers where applicable, and any laboratory processes identified as large users should be evaluated. The LEEDv4 prerequisite and credit for Water Metering provides a suitable approach for evaluating an advanced water metering strategy.

Addressing Process Water Consumption: The potable water supplied to laboratory processes can constitute a large portion of the overall water consumption for laboratory buildings. While addressing water efficiency at the building systems level is important, opportunities to reduce potable water consumption should also be investigated by examining laboratory processes and the systems that supply them. This should be further examined during detailed design. Preliminary recommendations for water saving strategies include the following:

- Eliminate the application of once-through water use to any laboratory equipment unless it is explicitly required. Use closed-loop systems or non-potable water where appropriate.
- Install process water use meters to provide actionable information to laboratory users and building operators about water consumption.
- Investigate opportunities for the re-use of waste process water (e.g., treat and downcycle for use in cooling towers or other building applications).
- Provide water efficient systems for wash-up (e.g., use floor-washing equipment as an alternative to hosing floors).
- Identify specific laboratory processes that are water-use intensive and dedicate effort to coordinating process-specific water reduction strategies.

- Engage target users early in the schematic design phase to develop a facility-specific target for water-use reduction.

Integrating Green Infrastructure for Stormwater Management: The site development should aim to maximize the treatment and reuse of rainwater on-site, as described in **Section 5.2.3.** If the project is in a semi-urban site with surface parking, it will be critical to implement zero-runoff strategies for any hardscaped portions of the site, using features such as swales and rain gardens to integrate stormwater infrastructure, landscape design, urban design, and visual amenities. Pervious pavers should be implemented to manage stormwater and reduce the increase in urban heat island effect. **Figure 5.5** shows an example of how green infrastructure can be used to integrate landscape, urban design, and stormwater management features.

Figure 5.5: Green Infrastructure Example

5.2.4 HEALTH AND WELLNESS STRATEGIES

Discussions held during the integrated workshops initially centered on indoor conditions proposed for the laboratory, high bay, and office workspaces. Natural ventilation and expanded temperature set points were initially discussed as energy savings measures. The current high bay spaces do not have mechanical cooling and temperatures often reach temperatures in the high twenties (°C) during the summer season.

Exploring expanded temperature ranges for other spaces can be discussed during the detailed design stage; however, the TSTS Hub agreed that this would represent a departure from the current conditions and would therefore require a change management approach. Similarly, natural ventilation was identified as a topic for future discussion but would likely focus on lobby/feature spaces given the local climate in the NCR.

During Workshop 3, FW delivered a sustainability primer to the TSB HO that focused on workplace and wellness. General heath and wellness design strategies were reviewed, as described in **Section 5.1.5**. A case study was presented on the Arthur Meighen Building Rehabilitation in Toronto; this PSPC-led project will provide a modern, healthy workplace for a variety of government tenants. Specific features and benefits that were presented include:

- Low-VOC materials used throughout the interior construction.
- A central, feature stairway that provides opportunity for movement and activity and creates spaces for collisions and interaction.
- Interior design elements chosen to express biophilic design and moments of Canadian landscape and history.
- WELL Silver and LEED Gold certification targets.

Figure 5.6: Design rendering of interior common spaces at Arthur Meighen Building showcasing flexible spaces for socialization and biophilic design elements (FW)

To achieve health and wellness goals, the following strategies should be considered at the early design phases (i.e., Concept Design and Schematic Design):

- Provide access to abundant natural daylight.
- Optimize the amount of vision glazing and balance daylighting with thermal performance.
- Locate regularly occupied spaces within 4.5 m of the building’s perimeter.

- Provide views from work points and meeting rooms (i.e., quality exterior views or atrium spaces)
- Support an active lifestyle at work and encourage movement.
- Encourage healthy transportation and provide amenities for commuters.
- Embrace biophilia and the incorporation of natural materials.
- Provide access to drinking water and healthy food choices (i.e., fridge storage and café areas).

5.2.5 MATERIALS AND RESOURCES STRATEGIES

Discussion regarding materials primarily focused on the selection of materials for structural systems. It was agreed that the length of spans required for high bay spaces would require a steel structure. Mass timber was discussed as a potential alternative for office and lobby/circulation spaces. This discussion focused on the following environmental benefits of a mass timber approach and enhancements to interior environmental quality:

- **Use of mass timber structure can substantially reduce** the embodied carbon of construction. When sourced appropriately, engineered wood products can sequester carbon dioxide (CO_2) and substantially reduce the embodied carbon for structural materials. It is important to specify that the wood used to manufacture the mass timber products will be supplied according to standards for sustainable forestry.
- **Exposed timber structure is a feature to contribute to a biophilic design strategy.** Visible wood texture in the space creates a pleasant use of natural, indigenous bio-based material that is a visible statement of sustainability. In combination with other measures, this represents an opportunity to enhance biophilic design (introduced in **Section 5.1.5**).
- **Encourage the use of Low-Impact Materials through Transparency**: During the detailed design, material specifications should focus on materials with a reduced environmental impact compared to the alternatives. Encourage transparency by specifying products that are provided with an Environmental Product Declaration (EPD).
- **Encourage the use of Healthy Materials** through Transparency: During the detailed design, material specifications should focus on the use of healthy materials. Encourage transparency by specifying products that are provided with a Health Product Declaration (HPD).

5.2.6 FUNCTIONAL PROGRAMMING LIFE CYCLE ASSESSMENT REPORT

FW conducted a preliminary LCA to provide information on the material characteristics of the TSTS Hub and to grant insights into additional strategies that may be employed to reduce embodied carbon and environmental impact.

Together with operational carbon analysis, the LCA enables a greater understanding of the carbon drivers in the facility. The functional programming LCA focuses on structural components and the exterior envelope of the building. Without a completed design, several assumptions were made to determine the structural quantities for various portions of the facility. Special consideration was given to the office block, where steel, concrete, and mass timber have all been considered as materials.

The analysis results for the mass timber option show a total embodied carbon of **7,544 t CO_2e** and a unitary embodied carbon of 328 CO_2e kg/SQM. This compares favourably to the industry average of

361 CO_2e kg/SQM reported for various building types, as calculated using information from the Carbon Leadership Forum benchmarking study. For more information, see the LCA Report in **Appendix J.**

The overall embodied carbon in the building is most significantly influenced by concrete, which is largely present in the substructure. While concrete will not be eliminated in the building, carefully specifying the material and its source can improve the building's carbon footprint. Similar considerations can also be made for other building materials.

5.2.6.1 Operating Carbon vs. Embodied Carbon

Globally, the building sector, materials, and operations account for over 33% of annual GHG emissions, with building materials alone contributing 11% (IEA, 2019). Architecture 2030 estimates that embodied carbon will be responsible for almost half of total new construction emissions between now and 2050.

The Greening Government Strategy establishes that new development within the federal government portfolio should be Net-Zero Carbon at minimum and requires that LCAs be conducted to identify opportunities for reducing embodied carbon.

Table 5-2 summarizes the embodied and operating carbon results presented in the LCA report and in the energy model report, normalized per unit floor area.

Table 5-2: Embodied Carbon vs. Operating Carbon

Parameter	Industry Average	TSTS Hub Preliminary Estimate
Embodied Carbon (Up-Front)	361 CO_2e kg/SQM	328 CO_2e kg/SQM
Operating Carbon (Annual)	260 kgCO_2e/SQM (approx.)	11.1 kg CO_2e/SQM

The embodied carbon estimated in the preliminary LCA report is slightly below the industry average. However, the operating carbon is significantly lower than average, largely because of the energy efficiency and electrification measures described earlier in this section. The embodied carbon for the proposed building is almost 30 times greater than the estimated annual operating carbon. The proposed building is forecasted to be operating for almost 30 years before the operating carbon emissions catch up to the embodied carbon; this is motivation to pursue measures that will further reduce embodied carbon.

5.3 RECOMMENDATIONS

The spaces included in the TSTS Hub program are well-suited to the development of a world class laboratory building that exemplifies the defining characteristics and achieves Net-Zero Carbon and Net-Zero Energy Ready.

Applying the strategies described in **Sections 5.1 and 5.2** as deemed appropriate for the project site and the various spaces within the TSTS Hub program will fulfill the sustainability agenda for Laboratories Canada, deliver a facility that is a proud home for the TSB, and the NRC SMPL, and create a great place to work that supports excellence in scientific research.

Site selection will enable the development of several recommendations that are site-specific and contribute to the overall goals for sustainability and low-carbon design. These goals include low-carbon transportation, healthy public space and community integration, local ecology, renewable energy, and optimization of the building form following passive design principles.

At this Functional Programming stage, recommendations are focused on applying the IDP and setting targets, as described in **Section 5.1.1.** Analyzing the equipment and process needs of the TSTS Hub will enable the setting of appropriate targets for energy and GHG that will contribute to a Net-Zero Carbon or Net-Zero Energy Ready facility. Specifically, the plug and process load analysis described in **Section 5.2.2.2** will be used to set appropriate targets for the overall building energy use and GHG emissions. These will be applied to building-level analysis during the Schematic Design phase.

Specifically, the following activities are recommended to contribute to the improved sustainable performance of the TSTS Hub:

- **Site Selection and Optimization:** Choose a site that is suited to hosting a high-performance laboratory building. Availability of clean energy, urban integration, connection to mass transit, and provision of a healthy public space will contribute to a sustainable, zero-carbon facility. Use the site options analysis study to ensure that siting and building form contribute to a healthy, thermally efficient building.
- **Evaluation of Energy and Carbon Measures Using Life Cycle Cost Analysis:** Conduct an Energy and GHG Options Analysis for the facility, according to the federal methodology which uses Life Cycle Cost Analysis (LCCA) to evaluate measures and options. This study should be completed prior to the beginning of Schematic Design phase (or during Schematic Design). The GHG Options Analysis should make use of information related to laboratory equipment and process loads that are detailed in this report.
- **Develop Site-Specific Strategies for Stormwater Management, Healthy Community, and** Ecological Restoration: Perform an analysis of the site, during the Schematic Design phase or earlier, to maximize opportunities for urban and ecosystem restoration and to identify clear strategies to improve outcomes for social and environmental sustainability.
- I**mplement the Integrated Design Process:** Conduct workshops during the Schematic Design phase to create the project vision, set goals, and evaluate strategies for site, water, ecology, energy and carbon, and indoor environmental quality. Conduct subsequent workshops in Design Development to affirm goals and calibrate performance targets. Research, energy modelling, LCA, and engineering analysis should be used to inform the workshop sessions and target-setting process.
- **Optimize for Lower Embodied Carbon:** The preliminary Life Cycle Assessment included in this report indicates that simple strategies to lower embodied carbon can achieve reductions below the average $kgCO_2e$/SQM for comparably sized buildings of all typologies. However, this is based on preliminary inputs and very high-level assumptions for building properties and materials. Materials research and preliminary/detailed LCA should be conducted in the Schematic Design and Design Development stages to inform the design process and identify opportunities to further reduce the embodied carbon of construction.

6.0 OPERATIONAL CONTINUITY

A number of large pieces of equipment are currently in use at the existing facilities for the TSB Engineering Lab and the NRC SMPL. Operational continuity during the construction and the post-construction phases of the project will require attention to the detailed scheduling of equipment relocation and installation requirements. Certain equipment operations are time-sensitive or of long duration and would be negatively affected by a shutdown or interruption of service.

The TSB Engineering Lab and the NRC SMPL currently operate equipment that is very large or heavy, which may necessitate the phased construction of enclosing walls and the use of heavy lift moving equipment (e.g., cranes) for relocation. Other pieces of equipment have highly sensitive calibration and may require strict environmental and handling measures during relocation.

Most relocated equipment will require specialized connection to supporting building infrastructure, including mechanical and electrical systems to support their operation. This will necessitate downtime periods while these connections are being implemented. After connection, commissioning and calibration will be completed to ensure fully functional operational capability.

A detailed review and move plan for equipment relocation scheduling, construction sequencing, equipment systems connections, and equipment commissioning will be essential to provide a smooth and effective transition from the existing facilities into the new TSTS Hub facility location and operations. It will be important to identify which equipment is of critical function and develop a methodology to replace with minimal disruption to the ongoing operational needs. If possible, existing equipment that can be phased out or replaced with new should be considered as one option to minimize disruption. Timing of equipment shutdowns should be scheduled to coincide with operational breaks or periods of inactivity.

7.0 SITE REQUIREMENTS

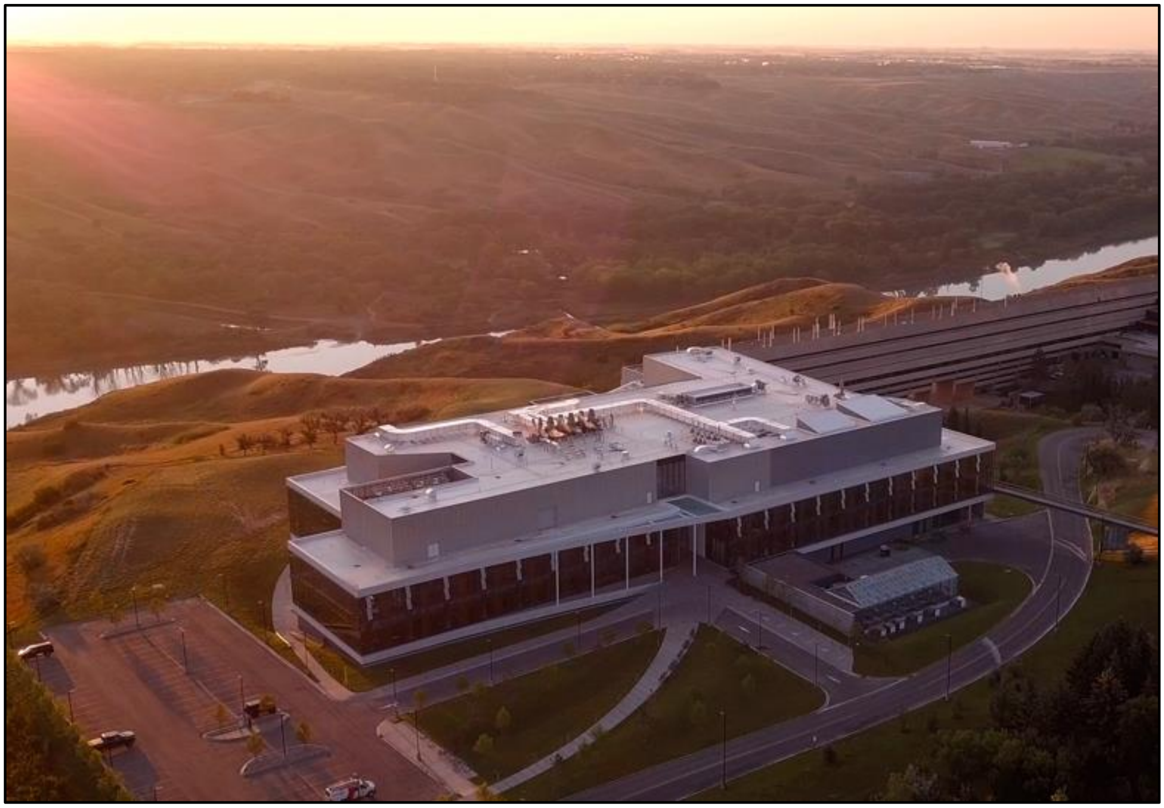


Figure 7.1: University of Lethbridge, Science Commons (Lethbridge, AB)

7.1 SITE SECURITY REQUIREMENTS

Site security must be addressed for physical and visual control of the property, as determined by the Security Space Requirements document, the TRA recommendations, and the Security Design Brief. The following factors should be considered during the design and development of the site:

- Preliminary Security Requirements (PSR) and Security Space Requirements (SSR) documents.
- Site access points and circulation for ease of movement and security.
- Building frontages and architectural site features designed to respond to the site context.
- Screening for physical security and visual control.
- Building and lot lighting designed for safety, aesthetics, and glare control.
- Deliveries and loading bays located away from site frontages and in a secure area.

7.2 PARKING REQUIREMENTS

Vehicle parking is required for government staff and visitors of the site based on building occupant load, zoning by-law regulations, accessibility requirements, and operational needs. Government fleet vehicle parking must be accommodated in a secure location, with convenient access to the building entrance. EV charging stations should be accommodated. Ridesharing and carpooling strategies should be considered in the parking layout and design. Roads for visitors and employees must be separate from the wreckage and storage yard access roads. Bicycle parking must be provided for staff and visitors based on zoning by-laws and the TSTS Hub and TSB HO requirements. For the 66% submission, 116 parking stalls for staff was identified based on initial zoning by-law requirements and building size. The number of parking stalls is now updated to provide 185 staff parking stalls as requested by the users and as outlined below. It is noted that the number of parking stalls being provided based on the user requests exceeds the minimum number of stalls that are required to be provided by the zoning by-law for this building size and occupancy type.

Visitor parking requirements are not clearly defined in the zoning by-laws that states that no more than 30 visitor parking stalls is required for this zone and building type for this zone. For the size of this building and anticipated number of visitors to the facility during operational hours, it is recommended that a minimum of 10 visitor stalls be accommodated with 7 stalls to be located near the building entrance. It is expected that additional visitor parking may be accommodated on adjacent property for public events that may occur after regular working hours.

Accessible parking requirements as stated in the City of Ottawa Zoning By-laws would require only 1 accessible stall for every 100 parking stalls. It is recommended that the number of accessible stalls provided be increased to a minimum of 3 to 4 accessible stalls for every 100 cars.

7.2.1 TSTS HUB REQUIREMENTS

For the TSTS Hub, the total vehicle parking requirement is seventy-two (72) spaces as requested by this user group (i.e., 48 spaces for the NRC SMPL and 24 spaces for the TSB). In accordance with the SSoR, there is a requirement for 3 fleet vehicles parking for the TSB to be accommodated. Allowance for visitor parking must be provided in addition to the required parking spaces noted above. Accessible and EV parking must be included based on applicable zoning by-laws and Laboratories Canada requirements.

Bicycle parking for TSTS Hub must be provided for twenty-three (23) bicycles and must be secure, monitored, and weather protected.

7.2.2 TSB HO REQUIREMENTS

For the TSB HO, a 0.75 factor (i.e., 75%) to the total FTE population of one hundred and forty-eight (148) for the TSB HO staff parking requirements has been established as requested by this user group. Based on the calculation, the total estimated vehicle parking requirement for the TSB HO is one hundred and eleven (111) spaces. Allowance for visitor parking, one space for a fleet vehicle, and one space for the DM must be provided in addition to the required parking spaces noted above. Accessible and EV parking must be included based on applicable zoning by-laws and Laboratories Canada requirements.

Bicycle parking for TSB HO must be provided for twenty (20) bicycles, and it must be secure, monitored, and weather protected.

7.2.3 TSTS HUB AND TSB HO MINIMUM PARKING REQUIREMENTS SUMMARY

In summary, the total vehicle parking for facility staff is one hundred and eighty-five (185) stalls (not including visitor parking). The total bicycle parking for staff is forty-three (43) bicycles (not including visitor bicycle parking). Table below provides a summary of required parking.

Table 7-1: Minimum Parking Requirements

Group	Vehicle Parking	Bicycle Parking
TSTS Hub	72 Staff (includes 3 fleet vehicles for TSB)	23 Staff
TSB HO	113 Staff (includes 1 for DM and 1 fleet vehicle)	20 Staff
Visitor Parking	10 Visitor stalls recommended (7 Visitor recommended outside building entrance)	
Total	**185 Staff + 10 Visitor**	**43 Staff**

7.3 PEDESTRIAN REQUIREMENTS AND RECOMMENDATIONS

The accommodation of pedestrian movement around the site and into the TSTS Hub facility must address site design planning issues (e.g., providing convenient access, safety, security, and wayfinding). Design objectives for pedestrian circulation include the following:

- Provide for staff and public entry points, staff parking, bus access, loading and delivery vehicles, and site security.
- Provide proper separation of vehicular and pedestrian routes for safety.
- Design vehicle parking and bicycle parking with convenient access to staff lockers and building entrances.
- Provide well-lit, secure, and safe pedestrian routes. Implement Crime Prevention Through Environmental Design (CPTED) guidelines.
- Integrate landscaping, exterior amenity spaces, and public elements into the overall facility image and architectural design response.
- Address opportunities for public transit and proximity to multi-modal transportation routes.
- Respond to active transportation, cycling, and pedestrian routes.

7.4 VEHICULAR REQUIREMENTS AND RECOMMENDATIONS

The design of the transport/delivery traffic patterns around the building should be arranged so that the truck driver will be on the inside of each turn (i.e., in the lane closest to the building) for best control of the truck. Where traffic is on the right side of the road and the driver’s seat is on the left side of the cab, truck movement around the building should be counter clockwise.

The following traffic communication lights must be provided: an outside signal light and one regular and one reversible instruction sign. An interior control panel will be provided, with signage indicating to the operator to load or unload during the green light only.

A traffic study is being performed under the Test Fit report and it should be considered in conjunction with the recommendations above.

7.5 MATERIALS/SPECIAL STORAGE REQUIREMENTS

A large outdoor area dedicated to the storage of wreckage pieces and ISO (International Organization for Standardization) shipping containers must be provided. The wreckage storage must be suitable for periods ranging from six (6) months to two (2) years. The location and configuration of the storage yard must allow for sufficient storage space and handling of multiple ISO containers and/or large wreckage pieces. Stacking ISO containers will be considered for efficient use of storage space. Grade-level access for loading/unloading and maneuvering of full-sized highway tractor and semi-trailer vehicles is required outside of the high bay areas.

Access for delivery and handling of large items (e.g., small aircrafts, marine vessels, rail, and vehicles whole or in-part) is required. The site and the access to the grade-level unloading area will require ample room to maneuver a single truck/van (e.g., ranging in size from local delivery vehicles to full-sized highway tractors and semi-trailers) at a time. The loading facilities must accommodate a loading door that is at least 15 m wide × 7 m high, with clear access for a crane to extend/lift wreckage from a flatbed truck. Swing space will be required for the pick-up and drop-off of two ISO shipping containers.

Space equivalent to the high bay investigations area will be provided to address unexpected critical investigations and surge requirements. Covered storage area or warehouse to store materials until a high bay area is available (i.e., versus redundant space) will be provided to allow multiple investigations to be undertaken simultaneously.

Storage for hazardous materials awaiting disposal is required. Hazardous materials may include oil, petroleum, lubricants (e.g., for two (2) drums and shelving), corrosive materials, and low radioactive materials (e.g., aircraft instrumentation). This area must have controlled access, drainage, and spill containment.

7.6 ADDITIONAL SITE PROGRAM REQUIREMENTS

7.6.1 NRC SMPL

The NRC SMPL requires a fuel farm to store jet fuel. The fuel farm must be accessible to fuel trucks for periodic delivery. This area should be secure and visually segregated. The fuel farm has the following design requirements:

- Full-security fencing with a controlled access and egress point into the fuel farm area.
- A covered fuel transfer area with a durable concrete spill protection berm.
- One aboveground storage tank (AST) with a 2500 L capacity. The AST should be covered (e.g., an open canopy structure).
- One underground storage tank (UST) with a 25 000 L capacity. The UST must be a corrosion-resistant, structurally integral, double-wall fiberglass type equipped with level and leak monitoring.
- All piping must be double walled and monitored for leaks.
- An unload transfer area must be accessible by large fuel transport trucks (i.e., up to 16.2 m semi-tractor trailer) to drive through the property without backing.

- The product transfer area must be designed to contain spills during the transfer process as required by the Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations (SoR 2008/197)
- It must be close to the burner rig test cells, due to pump control and fuel draw requirements.
- It should have space for fuel tanker parking and a temporary storage tank.
- The fuel lines to the building must accommodate liquid fuels, natural gas, and hydrogen.

Long-term storage is required for test parts as aircraft specimen library, and for future failure analysis after the testing. The material must be stored in a weather-enclosed and secure building.

A covered outdoor storage area of 230 SQM is provided in the program.

7.6.2 TSB ENGINEERING LAB

The TSB Engineering Lab requires the site to be close to major transportation corridors to be practical for the transportation and delivery of large pieces of evidence (e.g., wreckage from an aircraft or rail cars, or railway tracks).

A segregated area for decontaminating wreckage upon arrival from investigation sites is to be provided inside of the TSB high bay space. This area should be large enough to accommodate large vehicles for unloading and to allow for forklift maneuvering, overhead cranes, and loading/unloading of pallets, parts, and shipping containers. The decontamination area should have controlled drainage and be equipped for cleaning and washdown of contaminated materials or equipment.

7.6.3 TEST FIELDS

A fenced-in enclosed space is required for heavier test rigging, storage of full-scale test fixtures, and client-owned full-scale test article shipping containers. This area should be secure, visually segregated, and provided with the necessary service utilities for equipment operations.

7.7 EXPANSION OPPORTUNITIES

There are no requirements for expanding the facility or outdoor site identified at this time. However, expansion of the building both horizontally and vertically should be considered in the layout and site planning of the TSTS Hub facility. This will help to accommodate future program requirements and will result in additional flexibility of site use. Some exterior site components should also be considered for potential future expansions (e.g., increased capacity for loading and unloading in the materials and equipment storage areas).

7.8 OUTDOOR SPACE VARIANCE COMPARISON

The FW team developed the areas for outdoor space requirements for the science program component based on consultation with the TSTS Hub and a review of zoning by-laws for parking, building setbacks, and landscape zones. Site areas for the open and covered outdoor storage, container storage, fuel farm, and fuel storage were identified. These areas are provided in **Table 7-2.** Requirements for vehicle loading and unloading, size, and circulation were factored into the site program area. The initial area for site parking was established at one hundred and sixteen (116) vehicles at the 66% Functional Programming phase and was updated to one hundred and eighty-three (183) vehicles based on input received for the 100% Functional Programming report. These parking areas do not include the visitor or fleet vehicle parking, site drop-off, or delivery vehicle parking that will need to be incorporated into the outdoor site development.

Table 7-2 summarizes the outdoor space areas provided from the SSoR that was revised and updated for the 100% Functional Programming report. There is a significant increase from the SSoR in the outdoor space needs to satisfy the operational requirements for the facility as a result of confirming the unsized elements included in the SSoR. Strategies to reduce outdoor space area requirements may include reducing or relocating parking off site or providing structured parking. Although reducing or relocating outdoor storage off-site may be considered, this would affect operational capacity and function for the facility. The areas for fuel farm, truck loading, decontamination, and garbage and recycling areas are essential to the facility's operations and are not to be reduced.

Table 7-2: Outdoor Space Variance Table

Space Name	SSoR Net Area SQM	MP - FW Forecast Net Area SQM	66% FPR - FW Forecast Net Area SQM	100% FPR - FW Forecast Baseline Option Net Area SQM	100% FPR - FW Forecast Further Optimization Option Net Area SQM
Outdoor Storage including container storage area	1,450.00	1,685.00	3,480.00	2,270.00	1,950.00
Fuel Farm and Fuel Storage	–	–	145.00	145.00	145.00
Covered Storage	–	–	230.00	230.00	230.00
Loading Area (3 Loading Truck Bays and Circulation)	–	–	635.00	635.00	635.00
Traffic/Road Circulation – Allowance for Large Truck Turning Radius to be Considered	–	–	1,000.00	1,000.00	1,000.00
Garbage/Recycling Bins	–	–	300.00	250.00	250.00
Sub-Total Science Program Outdoor Requirements	**1,450.00**	**1,685.00**	**5,790.00**	**4,530.00**	**4,210.00**
Hard and Soft Landscaping (about 10%)	–	–	1,850.00	1,850.00	1,850.00
Covered Bike Storage (43 Bicycle)	–	–	–	85.00	85.00
Parking – Reference Section 7.0 & 11.0	–	–	3,700.00	5,000.00	2,300.00
Totals – Outdoor Requirements	**1,450.00**	**1,685.00**	**11,340.00**	**11,465.00**	**8,445.00**

8.0 NON-TYPICAL LAB SPACES AND UNIQUE REQUIREMENTS

Non-typical lab spaces for the TSTS Hub include open/enclosed offices, meeting rooms, formal/informal collaboration spaces and public/shared spaces, and venues where science can be displayed. Standard facility support spaces for staff use and support spaces for building operations will also be required.

In addition to the facility's operational requirements, the TSTS Hub needs to accommodate public touring of certain areas for educational and viewing purposes. This may be provided by introducing raised viewing platforms and walkways that overlook program areas that are secure and controlled for visitor access.

While reviewing these spaces, the TSTS Hub project team emphasized the importance of establishing synergies. The objective of synergies is to consolidate/share spaces, equipment, and support spaces. While the NRC SMPL and the TSB Engineering Lab are currently spread across several buildings, the TSTS Hub now has a significant opportunity to establish more cost-effective infrastructure and foster a collaborative environment.

When designing non-typical lab spaces, the following criteria should be considered:

- Design excellence
- Health and safety requirements
- Environmental
- Future flexibility, expandability, and adaptability
- Acoustic separation requirements
- Proximity to public access or limitation of public access
- Universal design considerations
- Collaboration and sharing of information
- Science on display
- Physical security
- Siting requirements
- Access to the outdoors and amenity spaces (if required)

9.0 ENGINEERING PROGRAM BRIEFS

9.1 PRELIMINARY STRUCTURAL ENGINEERING RECOMMENDATIONS

The TSTS Hub facility is being developed to house NRC SMPL and TSB research operations. The facility contains a mixture of high bay laboratories, mid bay laboratories, smaller laboratories, support spaces, and office spaces. The structural system is being developed to satisfy the functional and architectural requirements of the building and to accommodate the mechanical and electrical systems.

9.1.1 DESIGN PRINCIPLES

The Laboratories Canada design principles that are most closely related to structural engineering are Flexibility, Functional Suitability and Expandability, and Sustainability.

9.1.1.1 Flexibility

Structural design is crucial to the occupancy, performance, and longevity of any facility. The structure must be adaptable and able to accommodate changing programmatic or equipment requirements, operational techniques, and building services for similar design load parameters without additional structural members or reinforcing, with minimal disruption over the intended lifespan. These requirements can be accommodated using the following design principles:

- Stack lateral stability elements in plan and locate lateral load resisting elements around stair and elevator cores and around the perimeter (if required) to maximize the flexibility of the floor plate.
- Minimize the number and size of columns to maximize the floor space available.
- Design floor areas to accommodate equipment loads anywhere on the floor area allocated to that equipment.
- Design floors and roofs to be capable of supporting the future access, transport, installation, and removal of existing plant and equipment while the existing plant or equipment remains operational, without affecting vertically or horizontally adjacent areas.
- Prohibit the use of prestressed concrete.

9.1.1.2 Functional Suitability and Expandability

In addition to flexibility, the structural design will consider the functional suitability and future expandability of the TSTS Hub. The structural system will be designed for equipment and space functions. One special consideration is vibration. Adjacent sources of vibration from building use, operations, and equipment should be considered when determining the vibration effects. In areas supporting science equipment, microscopes, and other sensitive equipment, the building structure should be designed for the vibration and acceleration limits specified by the manufacturer of the specific equipment. Where identified by Laboratories Canada, the structure will be designed for vertical or horizontal future expansion without requiring the displacement or discontinuation of existing facility operations.

9.1.1.3 Sustainability

The use and selection of materials for the structural system will be determined with the overall sustainability of the project in mind. All materials and components used should support the following sustainability goals:

- Low-carbon intensity construction material
- Renewable building material
- Innovative structural components
- Emissions reduced concrete
- Recycled content concrete
- Local materials
- Low VOC-emitting materials

9.1.1.4 Other Considerations

In addition to the Laboratories Canada design principles for selecting the facility structural systems listed in **Section 9.1.1**, the following will be considered:

- **Structural economy:** Preference will be given to the most economical structural system if the performance is similar.
- **Structural serviceability:** Preference will be given to systems that minimize noise transmission over systems that do not. The potential for excessive structural deflections, vibrations, and movements will be carefully evaluated.
- **Durability and long-term maintenance costs:** Preference will be given to structural systems that have low long-term maintenance costs over systems that do not.

The final selection of structural systems must consider the cost of construction of the following:

- Architectural, mechanical, and electrical systems
- Vibration and noise control
- Floor-to-floor heights
- Fire protection requirements

Material and labour availability may have both economic and schedule implications on the project.

9.1.2 DESIGN CODES AND MATERIAL STANDARDS

The structural systems for the facility will be designed in accordance with the National Building Code of Canada (NBCC), the NBCC Structural Commentaries (Part 4 of Division B), and all referenced codes and standards. Where the following requirements exceed those noted in the NBCC, the more stringent will apply. The Structural Importance Factor for seismic, snow, and wind loads is “High”. It is recommended that the structural systems for the facility also meet the PSPC’s “Technical Reference for Office Building Design” where appropriate.

9.1.2.1 Design Loads

The structural systems for the TSTS Hub will be designed for the minimum uniform, superimposed dead and live gravity loads referenced below (see **Table 9-1**):

Table 9-1: Design Loads

Occupancy	Superimposed Dead Loads (kPa)	Live Loads (kPa)
Main Floor	1.5	4.8[1]
High Bay Floors	1.5	12.0[2]
Office	2.0	4.8
Laboratory	2.0[3]	4.8
Storage	2.0	7.2[4]
Common Area	2.0	4.8
Mechanical	0.8	9.6[5]
Roof Areas	1.8[6]	2.67[7]

For a detailed, room-by-room breakdown of the superimposed dead and live loads, refer to **Appendix E – Room Data Sheets**.

The lateral load-resisting elements of the facility (e.g., concrete shear walls, moment frames, and steel bracing) will be designed for the following lateral load design parameters based on the Ottawa (i.e., City Hall) climatic data:

- Reference hourly wind pressures: q (1/50) = 0.41 kPa.
- Internal Wind Pressure Coefficient: III.
- The seismic parameters prescribed in the proposed NBCC 2020 seismic hazard updates. The current NBCC 2015 seismic hazard values are included for comparison. An average shear wave velocity of 360 m/s (Site Class C) is assumed and is subject to geotechnical investigations for the chosen site (see **Table 9-2**).

Table 9-2: Seismic Parameters

Design Spectral Response Acceleration, S(T)	Proposed NBCC 2020	NBCC 2015
S(0.2)	0.66	0.44
S(0.5)	0.53	0.24
S(1.0)	0.39	0.12
S(2.0)	0.10	0.056

[1] Allowances and localized reinforcing will be made for specialty equipment located in the labs or for other items that exceed the uniform load allowances, including travel routes for equipment exceeding 1000 kg.
[2] High Bay floors requiring a strong floor to be designed for the specified anchorage loads in addition to the uniform live load of 12.0 kPa.
[3] Allowances and localized reinforcing will be made for specialty lab equipment or other items that exceed the uniform load allowances.
[4] Allowances and localized reinforcing will be made for racking loads or other storage requirements that exceed the uniform load allowances.
[5] An additional 2.4 kPa live load will be applied to floors and/or roofs above mechanical spaces.
[6] Ballasted roofs will require higher superimposed loads. The weight of Photovoltaic (PV) panels and associated racking is included in this value; associated wind load or uplift is not.
[7] Roof areas will also be designed for a 24-hour rainfall ponding as required by the NBCC to accommodate the roof discharge rate of rainwater. Snowdrift loads as prescribed by the NBCC Structural Commentaries will also apply to accommodate the roof profile. The roof areas will be designed for wind loads associated with the PV panel system. Where the panel layout deviates from the NBCC code limitations, a wind study will be completed to determine these loads.

Design Spectral Response Acceleration, S(T)	Proposed NBCC 2020	NBCC 2015
S(5.0)	0.026	0.015
S(10.0)	0.0084	0.0054
PGA	0.35	0.28

The structural systems for the project will be designed to limit the roof live load deflections to the lesser of Span/360 or 25 mm and limit the floor live load deflections to the lesser of Span/480 or 19 mm, while respecting the vibration criteria below sensitive laboratory equipment.

9.1.2.2 Material Standards

The structural components and materials will be proportioned in accordance with the requirements of the codes referenced in **Table 9-3**.

Table 9-3: Material Standards

Material	Relevant Code(s)	Elements
Concrete	• CSA A23.3 Design of Concrete Structures • CSA A23.1/A23.2 Concrete Materials and Methods of Concrete Construction/Methods of Test for Concrete • CSA G30.18 Carbon Steel Bars for Concrete Reinforcement	• Foundations • Slab on grade • Floor Slabs • Walls • Columns • Roof Slabs
Masonry	• CSA S304.1 Design of Masonry Structures	• Load bearing walls • Partition walls
Wood	• CSA O86 Engineering Design in Wood	• Miscellaneous framing • Mass Timber framing
Steel	• CSA S16 Limit States Design of Steel Structures • CSA G40.20/G40.21 General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel	• Open Web Steel Joists • Beams • Columns • Bolted Connections
Cold Formed Steel	• CSA S136 North American specification for the design of cold-formed steel structural members	• Steel Floor Deck • Steel Roof Deck • Exterior Stud Walls • Interior Stud Walls
Connections	• CSA W47.1-19 Certification of companies for fusion welding of steel (Div 1 or 2) • CSA W59.1-18 Welded steel construction • ASTM F1554-18 Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength • ASTM F3125-18 Standard Specification for High Strength Structural Bolts and Assemblies	• Welding • Anchor Rods • Structural Bolts
Parking Garage	• CSA S413-14 (R2019) Parking Structures • All applicable codes and standards noted here	• Building

9.1.3 STRUCTURAL PLANNING CONSIDERATIONS

The substructure of the TSTS Hub will be constructed out of cast-in-place concrete foundations and a reinforced concrete slab. A geotechnical assessment will be completed for the site. The optimal foundation system will be developed in collaboration with the geotechnical engineer.

The TSTS Hub is broken down into several distinct neighbourhoods. Each neighbourhood has unique structural considerations that impact the superstructure system selection. Speciality structural requirements include the following:

- Overhead cranes
- Jib cranes
- Strong floors
- Containment structures
- Pressure relief panels
- Heavy equipment
- Vibration-sensitive equipment

The following sections highlight some of these unique requirements. For additional details, refer to **Appendix E – Room Data Sheets.**

9.1.3.1 High Bays

The high bays neighbourhood consists of one (1) high bay laboratory for the NRC SMPL and one (1) high bay laboratory for the TSB Engineering Lab. The labs will be adjacent to one another. The new high bay spaces will be made flexible by providing a strong floor at the base of the space and adequate lifting capacity with overhead cranes above.

For the NRC SMPL, the structural integrity high bay will be a research facility with a laboratory that is approximately 40 m × 40 m. The laboratory area will be equipped with a 10-tonne overhead crane spanning 40 m, with a minimum of 15 m of clear space to the underside of the double crane hooks for testing, evaluation, and research regarding large transportation vehicle or infrastructure components.

The high bay will include a strong floor and strong wall system. The strong floor system will consist of four (4) strong floors, separated by service trenches. The strong floor system will include a grid of anchorage points spaced at 1 m on centre and will be capable of withstanding a 1000 kN vertical force at each anchorage point. The movable strong wall will measure 6 m high × 12 m long and consist of a grid of anchorage points spaced at 1 m on centre. The strong wall should be able to resist an overall moment greater than 1000 kNm. The strong floor system will be constructed out of heavily reinforced concrete. The moveable strong wall will be constructed out of steel and will be able to connect to the strong floor anchorage points throughout the high bay.

For TSB Engineering Lab, the high bay will be an investigative facility with a laboratory that is approximately 50 m × by 25 m. The laboratory area will be equipped with two 20-tonne overhead cranes spanning 25 m, with a minimum of 10.9 m clear space to the underside of the crane hooks. Both cranes will run on the same crane girders.

The superstructure for the high bay areas requires large clear spans and crane girders to support the crane above. A structural steel superstructure is most suitable to accommodate the high bay requirements.

9.1.3.2 Science Workshops

The science workshops are mid bay spaces with a variety of overhead and jib crane requirements. The machine workshop (i.e., one of the science workshops) will be approximately 27 m × 18 m and will require a two-tonne overhead crane spanning 18 m. Structural steel is most suitable to accommodate the structural requirements of the science workshops.

9.1.3.3 Metallography and Microscopy

The metallography and microscopy neighbourhood contains two scanning electron microscope (SEM) rooms. The floor structure in these rooms must be fully isolated from the rest of the structure to limit the vibration transmitted to the SEM equipment. The vibration limits and other design parameters will be coordinated with the SEM manufacturers.

9.1.3.4 Structural Integrity and HTM

The structural integrity and HTM neighbourhood are largely comprised of the material and component testing room. This space measures approximately 36 m × 22 m and contains a 10-tonne overhead crane spanning 22 m, with a minimum of 5.5 m clear space to the underside of the crane hook. This room contains several large pieces of equipment that will require slab thickening, service trenches, and other special support requirements. The slab details for this space will be developed in conjunction with the equipment manufacturers.

9.1.3.5 Heat Treatment and Research

The heat treatment and research neighbourhood have several speciality structural requirements. The spin rig equipment requires a steel encasement structure, separate from the superstructure of the facility. The encasement structure requires a minimum 50 mm thick steel plate walls on three (3) sides and on the ceiling. The demising wall opposite the open face of the steel plate spin rig containment structure will also be reinforced with 50 mm thick steel plate (or equivalent). The inner dimensions of the containment structure are approximately 5 m × 5 m × 5 m tall. A 0.5-tonne jib crane is required inside the containment structure and a 1.5-tonne jib crane is required in the equipment room to service the mechanical equipment.

The burner rig and hot isostatic press rooms require pressure relief exterior walls in case of an accidental high-pressure incident within the rooms. Reinforced masonry will be used for the interior walls and a lightweight steel system will be used on the exterior walls of these spaces to provide the necessary pressure relief.

9.1.3.6 Offices

The office areas generally do not require large spans or excessive clear headroom. The structural framing for these spaces can be made of conventional steel or concrete hybrid framing and must satisfy the design objectives noted previously. Depending on the final design of the building and on the sustainability goals,

hybrid cast-in-place concrete, steel, and/or heavy timber framing options may also be incorporated in the design. Heavy timber framing may be used for both functional performance and aesthetic purposes in the lobby and office areas, where the positive impacts of biophilia are experienced.

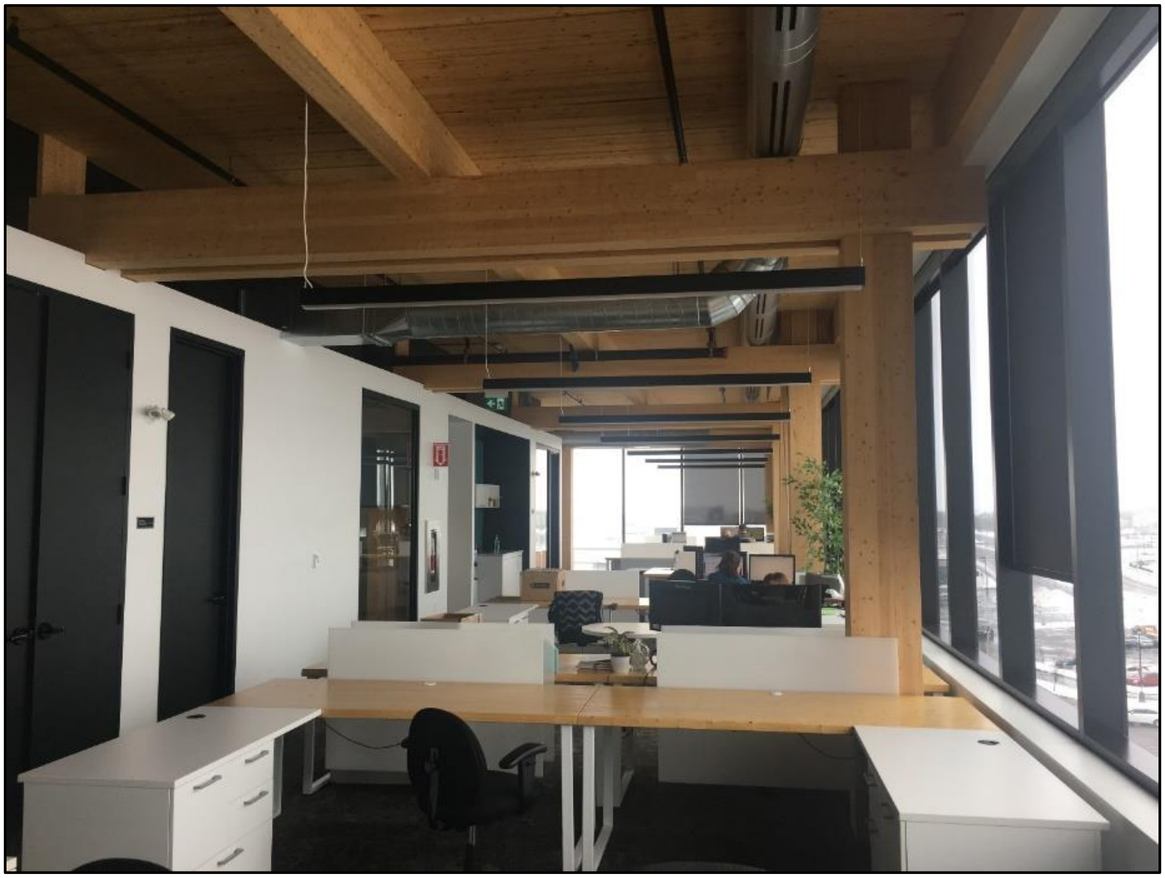


Figure 9.1: Complexe Synergia (Saint-Hyacinthe, QC)

9.2 PRELIMINARY MECHANICAL ENGINEERING RECOMMENDATIONS

The preliminary mechanical engineering recommendations included in this report describe the system design principles and mechanical infrastructure requirements that are anticipated to form part of the new TSTS program within the context of the TSTS Hub Mandate.

As part of the pre-design process for TSTS, several approaches to base building mechanical system design will be considered for investigation and feasibility analysis as the design progresses and as additional information becomes available to the design team. Any strategy presented should result in a best-in-class green building design and must compare favourably (via benchmarking) to characteristics of use in high-performance laboratory facilities.

Any base building mechanical systems identified in this report correspond with the above and are not intended to limit the design team's innovation, approach, or further investigation of high-performance technologies and opportunities available at the TSTS site during the next phase of design.

The following guiding principles will be followed:

- Provide a safe environment for facility occupants.
- Provide the necessary environmental conditioning to maintain occupant comfort and support research-related functions.
- Provide reliable and maintainable systems.
- Plan for future growth and adaptability to change.
- Incorporate Net-Zero Carbon and Net-Zero Energy Ready infrastructure.
- Incorporate optimized ventilation strategies without compromising IAQ or occupant health, safety, and comfort.
- Plan and design for intelligent and integrated smart building management technology.

9.2.1 DESIGN CRITERIA

9.2.1.1 Applicable Codes, Standards, and Regulations

The mechanical systems should be designed and built to meet the following codes, standards, and regulations, as well as the objectives of Laboratories Canada and the in-progress Repeatable Lab Design Framework (RLDF). The following list is not exhaustive and represents the minimum relevant codes and standards that should be adhered to. Where conflict exists between the codes and standards listed, the more stringent requirement will be applied, unless otherwise agreed upon by the facility users and Laboratories Canada. The latest edition of the identified and applicable codes and standards at the time of detailed design shall apply to the work.

- CSA Z316.5: Fume Hoods and Associated Exhaust Systems
- CSA B64.4: Backflow Preventers, Reduced Pressure Principal Type (RP)
- CSA B651-18 Accessible Design for the Built Environment
- MD 15128-2013, Laboratory Fume Hoods
- ASHRAE Standard 55.1: Standard for Thermal Environmental Conditions for Human Occupancy
- ASHRAE Standard 62.1: Ventilation for Acceptable Indoor Air Quality
- ASHRAE Standard 90.1: Energy Standard for Buildings Except Low-Rise Residential
- ASHRAE Standard 110: Method of Testing Performance of Laboratory Fume Hoods
- ANSI Z358.1: Emergency Eyewash and Shower Equipment
- ANSI Z9.5: Laboratory Ventilation
- National Building Code of Canada
- National Fire Code of Canada
- National Plumbing Code
- Model National Energy Code of Canada
- NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals
- NFPA 55: Compressed Gases and Cryogenic Fluids Code
- NFPA 72: National Fire Alarm Code
- NFPA 91: Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Non-Combustible Particulate Solids
- ACGIH Industrial Ventilation – A Manual of Recommended Practice
- ASHRAE Handbooks and Standards
- MD 15000: Mechanical Environmental Standard for Federal Office Buildings
- MD 15128: Laboratory Fume Hoods
- MD 15161: Control of Legionella in Mechanical Systems
- Cooling Technology Institute (CT) STD-201: Certified Cooling Towers

- CEPA SoR/2008-197 Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations
- Canadian Council of Ministers of the Environment (CCME) – Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products

9.2.1.2 Outdoor Environmental Conditions

Mechanical systems will be sized and selected based on outdoor air conditions published by the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) weather data for the weather station nearest the selected site, using 0.4% dry bulb and wet bulb summer conditions and the 99.6% dry bulb winter condition.

In addition to the above, climate-resiliency must be considered in the mechanical system life cycle design and evaluated at the earliest stages of detailed design with all stakeholders.

9.2.1.3 Indoor Environmental Conditions

Internal design temperatures for summer and winter conditions will be provided in accordance with ASHRAE Standard 55.1 and as dictated by the science program requirements.

A temperature setback strategy will be adopted to conserve energy during unoccupied hours unless specific lab functions require otherwise. Where flexibility is required for spaces to operate after hours, a local occupancy override will be provided.

Relative humidity for occupied spaces will be maintained in the range of 30% to 60% (+/- 5%), unless specific lab functions require otherwise.

Indoor environmental conditions for each space in the TSTS Facility were reviewed during an initial round of user group engagement workshops conducted during the Functional Programming Phase. These conditions have been recorded in the detailed RDSs.

9.2.1.4 Outdoor Air Ventilation Requirements

Each occupied space will be provided with minimum outdoor air ventilation rates in accordance with ASHRAE Standard 62.1.

Each laboratory and workshop will be provided with mechanically generated ventilation air supply in sufficient quantities to make up exhaust air, control airborne hazards, and maintain occupant comfort and acceptable indoor air quality. Ventilation air will be delivered in a manner that improves the effective air change rates in the space and promotes optimal directional airflow, while minimizing impact on any exposure control devices.

Optimized ventilation strategies will be deployed by the design team to minimize the ventilation load. An example of such a strategy is using a lab demand control ventilation system that is capable of modulating ventilation air rates in response to the measured concentration of contaminants in the occupiable workspace. The degree to which variable air change rates can be incorporated is currently being evaluated in further detail and is pending a thorough lab ventilation risk assessment. Passive ventilation strategies (e.g., natural ventilation) for the facility will be evaluated. These strategies are further described in **Section 5.0**.

9.2.1.5 Lab Ventilation Risk Assessment

One of the primary drivers of energy use in lab buildings is the high volume of laboratory ventilation air required to make up exhaust air, control airborne hazards, and maintain a required level of occupant safety and comfort. A simplified approach to lab ventilation would include over-ventilation, where more outdoor air is equated to higher occupant safety. This approach is not conducive to a high-performance laboratory design and will not support a sustainable outcome for the project. It is well-documented that a high volume of ventilation air alone will not guarantee effective control of airborne hazards in the lab space.

In many cases, it will be possible to reduce ventilation volumes and air change rates substantially from the traditional values of 6–12 ACH while maintaining the key objectives of the ventilation system. A Lab Ventilation Risk Assessment (LVRA) or integrated Laboratory Safety, Sustainability, and Ventilation Strategy is an approach often deployed on projects that aim to improve safety and optimize energy performance and ventilation rates.

The LVRA aims to identify hazards present in the lab and the protective capabilities of the space prior to establishing the demand for ventilation air and the range of modulation permissible. In this case, outdoor air supply is closely related to the hazard exposure risk in the lab.

As part of this functional programming stage of design, the team has initiated the process of documenting hazards present in the TSTS science spaces and the exposure control devices deployed to manage these hazards at their source. The team has not engaged in a formal process where these hazards are characterized or further evaluated to determine the appropriate exposure control devices, operating specifications, performance criteria, and resultant ventilation demand. Similarly, the working environment of the lab has not been reviewed for processes involved with the various exposure control devices. Clear documentation and understanding of these elements is a crucial first step in conducting an effective LVRA and requires various stakeholders (e.g., facility owners, facility operators, lab users, design consultants, environmental health and safety professionals and industrial hygienists) to be engaged.

The LVRA is critical to understanding the protective capabilities of the space and the minimum flow and range of ventilation air required to meet the safety and functional requirements of the occupants. The LVRA aims to identify the hazards present in each lab space, optimization strategies to contain and control hazards, and an ideal range of ventilation rates that will support a safe, efficient, and sustainable outcome. Finally, the LVRA will provide insight into the range of modulation required to meet the demand for ventilation in unoccupied and occupied conditions.

The LVRA is considered beyond the scope of this functional programming stage; however, it has been described in principle above for completeness. It is expected that a thorough LVRA will be undertaken by the design team during the earliest stages of Schematic Design. This LVRA will optimize ventilation rates, enhance the operational effectiveness of the lab spaces, minimize maintenance, and control problems, and maximize occupant safety and comfort.

9.2.1.6 Reliability, Redundancy, and Expandability

Mechanical systems and supporting infrastructure will be designed, selected, and constructed to meet the following minimum redundancy requirements:

- Sufficient capacity and arrangement within the central chilled water plant such that the remainder of the plant will be capable of supporting all critical cooling demands in the facility if a single component is out of service.
- Sufficient capacity and arrangement within the central heating water plant such that the remainder of the plant will be capable of supporting the full heating demand in the facility if a single component is out of service.
- Investigation of a reliable alternative potable water supply such that service to the facility will not be significantly interrupted in the event of failure of the primary source.
- Investigation of multiple ventilation air systems organized in a headered or parallel supply air and exhaust air arrangement to serve the science areas of the facility. This will provide redundancy in the ventilation air supply and exhaust.
- Sufficient capacity and arrangement for all infrastructure directly supporting the scientific equipment (i.e., hydraulic power plant, process cooling plant, and high-pressure compressed air plant components) such that the remainder of the plant will be capable of supporting the full demand if a single component is out of service.

Specific attention will be paid to mechanical infrastructure that directly supports critical research functions and laboratory areas. Proposed systems will be simple to operate and maintain, further contributing to the underlying reliability of the mechanical infrastructure.

Central mechanical plants will be constructed and sized to allow flexibility in program changes and/or moderate facility expansion. As an initial proposal, the ability for 30% expansion of capacity in central heating, cooling, and ventilation plant equipment should be considered for the facility to align with LC's Strategic Guidance. The required expansion area and impact on utility distribution services will be carefully reviewed against architectural implications, capital investment, and the ongoing operational efficiency of the systems and equipment.

Where possible, services will be located such that lab reconfigurations will minimize the need to relocate major services. Lab service connection points will be located such that future modifications and configurations of lab casework and equipment will have minimal impact on the delivery of the services.

9.2.2 FIRE PROTECTION SYSTEMS

The fire protection water service is anticipated to be supplied to the facility through the municipal system. An approved double-check valve type backflow prevention assembly, complete with supervised valves, will be provided in the water entry service to protect the municipal water system from potential contamination.

At this time, it is understood that the municipal water service at the selected site will have adequate capacity to support the fire protection requirements of the facility; therefore, on-site water storage to support the fire suppression system is not proposed. The need for a fire water booster pump will be assessed based on available flow test data at the selected site. If required, the fire water booster pump will be installed in a dedicated room with an appropriate fire resistance rating and direct access to the exterior.

The facility will be provided with an automatic sprinkler system, in accordance with the National Fire Code of Canada and NFPA 13 requirements. Based on the anticipated height of the building, it is understood that a standpipe and hose reel system will not be required; therefore, it is not proposed.

Where valuable or sensitive test equipment requires a higher level of protection against water damage, a dedicated double interlock pre-action fire protection system will be provided to protect the zone. During recent RDS workshops, the following areas were identified as candidates for these additional considerations:

- 1.1 NRC High Bay
- 3.2 Chemical Lab
- 3.14 Burner Rig #1
- 3.15 Burner Rig #2
- 3.19A SEM Lab A
- 3.19B SEM Lab B
- 3.23 Material and Component Testing
- 3.5 Spin Rig Test Cell

Fire extinguishers will be provided throughout the facility in accordance with the NFPA 10 requirements.

9.2.3 PLUMBING SYSTEMS

9.2.3.1 Domestic Potable Water

A domestic potable cold-water service is anticipated to be supplied to the facility through the municipal system. The incoming water service will pass through an approved, reduced-pressure-type backflow prevention device and utility water meter, prior to distribution to the facility. The domestic cold-water service will enter directly into a water service entry room, located at grade on an exterior wall of the facility.

The need for a domestic cold-water booster pump will be assessed based on the available water pressure at the selected site. Similarly, the requirement for supplemental water softening or treatment equipment will be evaluated based on a water quality sample analysis made available at the selected site.

Domestic potable water will be distributed to all areas that serve the public (e.g., washrooms, showers, and break rooms). Laboratory emergency response stations will be serviced by the domestic potable water distribution system.

Reducing the amount of water use is a key sustainable strategy that will be achieved by selecting low flow plumbing fixtures and exploring opportunities for recycling grey wastewater and captured rainwater for different functions (e.g., irrigation, toilet flushing, and cooling tower make-up) as applicable.

9.2.3.2 Domestic Hot Water

Domestic hot water will be generated and stored in multiple high-efficiency storage water heaters or instantaneous style water heaters, depending on the calculated load demand. The domestic hot water heater solution will ideally be focused on electric resistance heating elements.

Hot water will be recirculated back to the water heater source to raise the water temperature to 60°C. Storage tanks will store hot water at temperatures above 60°C where applicable, to minimize the risk of legionella and other bacterial contamination. Domestic hot water supplied to fixtures must be less than 49°C, to minimize the risk of scalding to users.

Opportunities to recover waste heat generated within the facility to pre-heat domestic hot water should be considered and explored by the team as the design progresses. Similarly, opportunities to preheat domestic hot water through solar collector(s) should be investigated as part of an energy conserving measure in the next phase of design.

9.2.3.3 Process Non-Potable Water

Laboratories and workshops will be provided with a dedicated source of non-potable domestic cold water for the exclusive use of laboratory equipment, plumbing fixtures, and hose-bib outlets. The facility non-potable water supply will have a backflow prevention device suitable for a severe hazard classification and will originate in the building's water service entry room.

9.2.3.4 Sanitary Drainage

Sanitary drainage will be collected within the facility and discharged by gravity to the municipal system. The use of lift or pumping stations to convey sanitary waste will be minimized and avoided where possible.

Grit and oil-water separators will be provided where necessary, to protect the building and municipal systems from potential contamination. During recent RDS workshops, the following areas were identified as candidates for these additional considerations:

- 1.1 NRC High Bay
- 1.2 TSB High Bay
- 3.23 Material and Component Testing
- 4.1 Spin and Burner Rig Equipment Support
- 4.12 Oil Storage Room

The use of a greywater recycling system for flush fixtures throughout the facility should be evaluated by the team as part of one sustainable design strategy. The application of drain water heat recovery systems should be evaluated by the team as part of another sustainable design strategy.

9.2.3.5 Storm Drainage

Storm water will be collected through conventional or flow-control roof drains and discharged by gravity to the site's stormwater infrastructure.

The recovery, and reuse of rainwater for irrigation, cooling tower make-up, and flush fixtures should be considered and investigated by the team in the next phase of design.,

The selection of roof drains and deployment of rainwater capture systems will be carefully coordinated with the overall site stormwater management strategy. Overflow drainage strategies will be incorporated as required and coordinated with architectural, civil, and stormwater management requirements.

9.2.3.6 Natural Gas Service

In support of the low carbon economy design for the facility, traditionally fuel-fired appliances are anticipated to be electrified.

A natural gas service utility is recommended to be extended to the site and facility as a redundant or peak-demand fuel source only. Natural gas service and associated meter/regulator assembly will be provided by the local utility service provider.

To future-proof the SMPL burner rigs, a natural gas supply line terminated in proximity for future tie-in was requested by the facility users.

9.2.3.7 Laboratory Gases – Compressed Gas Cylinder System

A variety of compressed gases will be required to support the test equipment, laboratory, and workshop functions. Point-of-use and centralized cylinder storage was discussed during the user group engagement workshops, as a potential strategy for storing and deploying the compressed gases throughout the facility. As the design progresses, it is recommended that a study regarding gas outlet locations and frequency of use be conducted to determine the approach of local bottle storage versus pipeline distribution systems.

A dedicated manifold and pipeline distribution of compressed argon gas to the hot isostatic press has been noted as a requirement. Similarly, a dedicated manifold and pipeline distribution of compressed propylene gas and compressed oxygen gas to the TGST rig has been noted as a requirement.

9.2.3.8 Compressed Air System

A centralized laboratory air compressor complete with an air filter, receiver, and dryer will be provided to produce laboratory-grade air. Laboratory air will be delivered through a pipeline distribution system and will include bench top, wall-mounted, or hose reel type outlet terminations, as required.

Compressed air quality must meet the ISO 8573 requirements.

9.2.4 TEST EQUIPMENT SUPPORT SYSTEMS

The TSTS lab spaces contain scientific equipment that requires additional support infrastructure and services independent of the base building systems. This support infrastructure will be dedicated to service the scientific equipment. Appropriate mechanical space will be programmed to house the associated central plant equipment.

9.2.4.1 Hydraulic Fluid Power Plant

A hydraulic fluid power plant will be required to support SMPL materials processing and characterization equipment in the NRC SMPL high bay area, materials, and component testing lab(s). In these lab(s), hydraulic-power rigid piping is proposed to be routed in an accessible trench terminating in floor-mounted manifold stations adjacent to the equipment served.

The hydraulic fluid power plant is proposed to be located in a dedicated space adjacent to the high bay area, materials and component testing lab(s). The plant will consist of multiple hydraulic power units, comprised of a hydraulic fluid reservoir, return filter, pumping equipment, and fluid cooler.

Dedicated hydraulic power units and distribution piping are proposed to serve the following laboratories:

- NRC high bay area, materials and component testing lab.
- Materials and components testing load frames.

9.2.4.2 Process Cooling Water Plant

A process cooling water utility will be required to support SMPL materials processing and characterization equipment. Process cooling water will be supplied through a dedicated piping loop to the NRC high bay area, materials and component testing lab; the high-pressure compressed air plant; and other lab spaces conducting structural integrity and high temperature materials research. Process cooling water will be circulated through two (2) centrifugal pumps operating in a duty/stand-by pumping arrangement.

Heat is proposed to be rejected from this process cooling water loop through an evaporative cooling tower or through a closed-circuit fluid cooler located on the facility roof, or adjacent to the facility on-grade. Each tower fan motor is proposed to be variable-speed and controlled by a variable frequency drive, to maximize energy efficiency. Alternative technologies for rejecting waste process heat (e.g., surface body water sources) should be evaluated as a means for reducing overall energy consumption.

Opportunities to recover waste heat from this system to pre-heat domestic hot water or to produce usable building heating water through heat pump technology will be considered by the team as the design progresses.

Significant disruption to the research and potential damage to equipment can occur if the flow of process cooling water to the facility is interrupted. Therefore, any solution proposed shall be able to reliably operate year-round and will be complete with the following redundancies to minimize downtime:

- Duty/stand-by pumping equipment and heat rejection equipment, such that the full load can continue to be supported if a single component fails.
- All equipment supplied by the emergency power distribution system.
- System maintenance components and replacement equipment will be readily available.

9.2.4.3 Compressed Air Plant(s)

A high-efficiency, high-pressure compressed air utility will be required to support materials testing equipment (e.g., high-velocity combustion burner rigs). The high-pressure compressed air plant is recommended to be located in a dedicated space close to the burner rig assemblies. This plant will be comprised of a high-pressure compressor assembly dryer, filter and a water-cooled after cooler and receiver.

A dedicated air compressor plant will be required to support the SMPL spin rig assembly. This plant will require a dedicated room adjacent to the spin rig and will consist of a compressor assembly, dryer, filter and a water-cooled after cooler and receiver. The spin rig assembly will also require a connection to the central process cooling water loop.

9.2.4.4 Jet Fuel Storage and Distribution Plant

A dedicated jet fuel farm consisting of storage tanks, distribution equipment, and piping will be required to deliver fuel to high temperature materials testing equipment (i.e., burner rigs). The fuel farm must be located in a secure compound and must be readily accessible by a fuel transport vehicle near the burner rig test cells.

Based on preliminary guidance provided by the facility users, fuel storage will consist of one above-ground, double-wall steel tank with 2500 L capacity and one underground double-wall fiberglass tank with a 25 000 L capacity.

Fuel transfer equipment will be located in a weather-proof enclosure within the secure exterior compound.

9.2.4.5 Electron Microscopy Equipment Cooling Plant

A small, dedicated, self-contained, closed-loop recirculating chiller will be provided, to support SMPL and TSB engineering lab electron microscopy equipment. This equipment must be located close to the scanning electron microscope(s) and will require a connection to the facility process cooling water loop.

9.2.5 HEATING AND COOLING PLANT

A local central chilled water and heating water plant is proposed for the facility. The technology and systems deployed for the central heating and cooling plants will have a notable impact on energy performance, as well as the capital and ongoing operating costs of the facility. This area will require cohesion with the overall heating, ventilation, and air conditioning strategy proposed for the facility. It is an area where a variety of possible solutions exist within the marketplace that can deliver on the sustainability goals and energy performance targets identified for the project.

At the current stage of design, multiple options are still being explored. It is recommended that a thorough analysis of these options be undertaken during the next phase of design, with an emphasis on energy performance, resultant carbon emissions, and life cycle costs. The following options may form part of this study, and would be expected to meet the functional requirements of the facility:

- Electric boilers and high efficiency water-cooled chillers
- Electric boilers and heat recovery chillers
- Ground source heat pumps

This is a sample representation of the central plant strategies that may be examined. Ideally, the deployed solution will maximize combined Coefficient of Performance (COP) of the central heating and cooling plants and prioritize the use of electricity in lieu of fossil fuels to generate heating energy.

9.2.5.1 Energy Recovery

The central heating and cooling plants should be integrated and should incorporate energy exchange technology to the greatest extent possible. This energy exchange should be available to increase overall system performance whenever there is a simultaneous heating and cooling load demand. For example, energy absorbed by the chilled water distribution system could be redirected to a condenser water system for re-use within the facility by a heat pump, to offset simultaneous heating load demands.

Alternative technologies for rejecting waste heat (e.g., well or surface body water sources) should be evaluated as a means for reducing overall energy consumption.

Opportunities to recover waste heat generated through the lab process cooling water system, to produce usable building heating water through heat pump technology, will be considered and explored by the team as the design progresses.

9.2.5.2 Heating Water Distribution

Heating water distribution systems will be an extension of the local central heating plant. These systems will supply heating energy for the following functions:

- Ventilation loads
- Envelope losses
- Terminal re-heat loads

Heating water will be circulated through a pumped, closed loop recirculation-type system throughout the facility. In general, pumping equipment will be designed for variable flow.

Heating water systems operating with low temperature water will be considered, to minimize energy impact. The decision regarding heating water operating temperature will be balanced and optimized with coil sizes, to minimize the operating energy impact on associated fan systems.

A minimum 11°C differential between supply and return water temperature will be considered for heating water systems. Opportunities to further increase this temperature differential will be explored as the design progresses, to optimize performance and system sizing.

9.2.5.3 Chilled Water Distribution

Chilled water distribution systems will be an extension of the local central cooling plant and will support ventilation air cooling and dehumidification functions. The systems will facilitate the removal of internal sensible and latent heat gains generated by the following:

- Equipment and lighting
- Occupants
- Envelope transmission
- Solar transmission

Chilled water will be circulated through a pumped, closed loop recirculation-type system throughout the facility. In general, pumping equipment will be designed for variable flow.

A minimum 6°C differential between supply and return water temperature will be considered for chilled water systems. Opportunities to further increase this temperature differential will be explored as the design progresses, to optimize performance and system sizing.

9.2.6 HEATING AND COOLING TERMINAL SYSTEMS

9.2.6.1 TSB Head Office, TSTS Science Office, and Public Spaces

A distributed heating and cooling terminal system is recommended to serve the TSB HO and TSTS office/public spaces of the facility. Potential system solutions include four-pipe fan coil units, variable refrigerant flow (VRF) terminals, radiant heating and cooling panels, or chilled beams operating in parallel with a central DOAS. The principal advantages of the proposed distributed heating and cooling terminal system are as follows:

- Improved indoor air quality (i.e., the ability to measure IAQ at each zone and respond with appropriate control measures through the DOAS).
- Improved energy performance (i.e., the overall reduction in centralized system fan horsepower due to the reduced airflow and size of the associated duct system, and the overall reduction in the volume of outdoor air required compared to a variable air volume [VAV] mixed air system).
- Improved occupant comfort (i.e., less air movement and mechanical noise generated in the occupied zone using the radiant system or chilled beam solution).
- Simplified control sequence of operations (i.e., no airside economizer controls required for central air handling equipment).
- Reduced mechanical space requirements (i.e., a reduction in ductwork distribution complexity and size will result in a reduced ceiling plenum and vertical service space).

9.2.6.2 TSTS Science Spaces

Mechanical cooling for the various TSTS laboratory and workshop spaces will primarily be delivered through the central laboratory and workshop ventilation and make-up air supply systems described in **Section 9.2.7.3**. Where additional cooling is needed beyond the minimum ventilation requirements for the space, local cooling terminal equipment is proposed to offset heat gains. This equipment includes two-pipe fan coils, VRF terminals, radiant panels, or chilled beams.

To offset envelope losses, it is recommended to provide heating using low temperature zone duct reheat coils and/or radiant ceiling panels. Where systems require that ventilation air be re-heated to maintain occupant comfort and indoor design conditions, the team will explore all available passive strategies, including waste heat recovery, prior to relying on the facility’s primary heating systems.

Grilles and diffuser placement will promote effective air change rates in the space and optimal directional airflow, while minimizing impact on any exposure control devices.

9.2.7 VENTILATION AND MAKE-UP AIR SUPPLY SYSTEMS

9.2.7.1 TSB HO

The TSB HO component of the facility is proposed to be served by a DOAS that will consist of two (2) parallel systems: a dedicated system for delivering ventilation air to each occupied zone, and a parallel distributed terminal system to handle the heating and cooling loads of the space.

The dedicated outdoor air handling system is proposed to be a custom, indoor VAV system. The system will be complete with the following components:

- Energy recovery device
- Chilled water-cooling coil
- Heating water coil
- Steam humidification section
- MERV 8 pre-filter
- Summer and winter pre-filter racks
- MERV 14 final filter
- Variable speed supply air
- Exhaust air fan(s)

The energy recovery device is proposed to be a total energy recovery wheel with a minimum total effectiveness of 70%. The energy recovery device will allow for the exchange of both latent and sensible energy transfer between the facility's exhaust air stream and outdoor air stream. This will help to reduce the energy requirements associated with mechanical cooling and heating of the facility's ventilation air. Other energy recovery technologies that provide a minimum 70% effectiveness may be explored by the team during the next phase of design.

The DOAS will incorporate a demand control ventilation strategy, using carbon dioxide (CO_2) sensors and VAV terminal units, to match outdoor air supply with maintenance of acceptable CO_2 concentrations in the occupied zone.

The redundancy of supply systems serving the TSB HO component of the facility are not currently being considered.

9.2.7.2 TSTS Science Office and Public Spaces

The TSTS office and public spaces (e.g., administration offices, break rooms, and collaboration spaces) are proposed to be served by an independent dedicated outdoor air system, operating similar to the TSB HO supply and terminal systems.

The TSTS science office and support spaces are proposed to be served by a similar, independent dedicated DOAS system that will have VAV to the extent practical. Opportunities will be explored to cascade air to the TSTS laboratories and workshops to minimize the overall building outdoor air requirement.

Redundancy of supply systems serving the TSTS science office, support, and public spaces are not currently being considered.

9.2.7.3 TSTS Science Spaces

The supply air system proposed to serve the TSTS laboratory and workshop spaces will consist of multiple dedicated outdoor air handling systems, oriented in a headered manifold arrangement, and located in a penthouse mechanical room. The headered manifold arrangement will provide an additional measure of redundancy for the laboratory and workshop spaces. The DOAS serving science spaces of the facility shall incorporate an energy recovery device to exchange energy between the exhaust air and outdoor air supply streams. A determination on airside recovery technology for the system should be optimized for maximum sensible and latent recovery based on a hazard and cross-contamination risk assessment.

The system is intended to have VAV to the extent practical, using an optimized ventilation control strategy to minimize ventilation load demands. One example of such a system is a Lab Demand Control Ventilation System that is capable of modulating ventilation air rates in response to the measured concentration of contaminants in the occupiable workspace. The degree to which variable air change rates can be incorporated is still being evaluated in further detail and is pending a thorough LVRA.

Laboratory and workshop ventilation air distribution systems will generally incorporate air control valves where tracking between supply, general exhaust, and containment exhaust systems is required, and where space pressurization maintenance is necessary.

Passive ventilation strategies (e.g., natural ventilation) should be evaluated for the facility. These systems are further described in **Section 5.0**.

9.2.8 EXHAUST AIR SYSTEMS

9.2.8.1 TSB HO, TSTS Science Office and Public Spaces

Exhaust air systems associated with the TSB HO and TSTS science office and public spaces will be limited to a general exhaust air system and independent sanitary exhaust air system.

9.2.8.2 TSTS Science Spaces

The TSTS laboratory and workshop spaces will be served by several independent exhaust air systems, as follows:

- General exhaust air system
- Sanitary exhaust air system
- Primary containment device (chemical fume hoods) exhaust air system

9.2.8.3 Energy Recovery

Energy recovery will be considered for each of the facility’s exhaust air streams. A preference for total energy recovery technology with an effectiveness greater than 70% (i.e., enthalpy wheels) is noted. Alternate heat recovery technology will be reviewed for select exhaust air streams (e.g., laboratory and workshop general exhaust air and chemical fume hood exhaust air systems), where a risk assessment determines that cross-contamination with the facility’s ventilation supply air could occur.

Renewable thermal energy sources (e.g., solar air pre-heating) should be evaluated for the facility. They are further described in **Section 5.0**.

9.2.8.4 Exposure Control Devices

Exposure control devices such as fume hoods, canopies, and extraction arms will be provided to control emissions at the source.

Where new fume hoods are supplied to the facility, low-flow technology and automated sash management control strategies should be considered.

Manifolding fume hood exhaust air systems and connection to one central fan system is recommended for the facility. This approach will be applied for fume hoods with similar uses and where no chemical reactions can occur. The central fume hood exhaust air system will be designed with N+1 redundancy and fed from the essential power system. Various heat recovery systems for central fume hood exhaust air streams will be considered in conjunction with a risk assessment for cross-contamination.

The stack exit velocity of the fume hood exhaust air system will be evaluated for a lower energy use that ensures safe and effective operation. Within the manifolded exhaust system's ductwork, there is an inherent increase in effluent dilution; by carefully studying the diluted plume's dispersion, exhaust fan energy use can be reduced. Plume dispersion calculations or atmospheric modeling will be performed, to evaluate exhaust re-entrainment and optimize stack exit velocity.

A dedicated exhaust air control valve will be provided for each containment device, with ductwork extending to the associated fan intake plenum.

Fume hoods or other local capture systems will not be the only means of room exhaust air. General exhaust air will be provided as required, to maintain ventilation rates and pressurization.

Where they are required, flammable storage cabinets are not recommended to be vented for fire protection purposes. The default condition will be non-vented flammable storage cabinets; venting will be considered on a case-by-case basis only. The cabinet should be supplied with factory-furnished vent ports and fitted with flame arrestors and removable seals. These ports will be leveraged should venting be required, for the purpose of protecting workers from exposure to harmful vapors.

9.2.9 INTELLIGENT BUILDING INFRASTRUCTURE

The building will be served by a centralized building automation system, complete with smart building technologies. This will allow for the secure convergence of multiple building operational technologies, including the following:

- Mechanical systems
- Lighting control systems
- Fire alarm systems
- Access control and security systems
- Energy and utility metering systems
- Renewable energy systems
- Emergency power and UPS systems
- Automated shades, operable windows, and other building element control systems as applicable

The energy management and control systems must integrate and provide system performance monitoring, trending, and comparison with historical performance to implement cognitive predictive approaches to system optimization.

Automated strategies (e.g., lighting controls or temperature adjustments) will be deployed during unoccupied settings to conserve energy, unless specific lab functions require otherwise. Where flexibility is required for spaces to operate after hours, local manual overrides will be provided. Manual overrides and other similar items will be addressed as part of the overall Intelligent Building Infrastructure strategy.

Control and monitoring features will be developed into a secure web or software-based Graphical User Interface to simplify operator training and the control and maintenance of the building. Cat 6A and/or fiber optic cabling to be used to form the backbone of the intelligent building system infrastructure.

9.3 PRELIMINARY ELECTRICAL ENGINEERING RECOMMENDATIONS

9.3.1 POWER

9.3.1.1 Utility Supply

The proposed site is the NRC Montreal Road Campus in Ottawa. The site is currently fed from the utility using a single 115 kV feed. It is distributed around the site at 13.2 kV. The feed for the new building will tap into the existing 13.2 kV ring and will provide two 13.2 kV: 600 V padmount transformers tied to a common bus, each sized to carry the full load of the building. The main electrical service to the building will be designed to meet Canadian Electrical Code (CEC) requirements, while factoring in a 25% spare capacity and redundancy as outlined in the in-progress RLDF. This building is defined as a Class 2 Electrical Classification, based on the in-progress RLDF.

9.3.1.2 Metering System

The TSTS Hub facility will be equipped with a complete, electronic networked metering system to monitor energy consumption. Digital meters will be provided on the main breakers and at all major distribution panels and motor control centres. Meters will communicate over a CAT6A network to a central software package that will be accessible to authorized personnel only.

All circuit breakers in main distribution boards (MDBs) and central distribution panels (CDPs) will be draw-out type, complete with integral metering and harmonic level monitoring and digital displays. Circuit breakers will be monitored by the power management system.

In addition to total energy, the following components will be metered separately for the entire facility:

- HVAC systems
- Interior lighting
- Exterior lighting
- Receptacle circuits

The metering system will interface with the intelligent building infrastructure to share energy information and allow for the calculation of virtual meters (i.e., lighting % × total wattage × number of fixtures = approximate power usage).

9.3.1.3 Lightning Protection

A lightning risk assessment will be completed in accordance with CAN/CSA B72-20, based on the building shape and location on the site. If a lighting protection system is deemed to be required, it will be installed in accordance with CAN/CSA B72-20 – Installation Code for Lightning Protection Systems.

9.3.1.4 Generator System

The building will be equipped with an emergency power generator system, to maintain critical life safety systems, security systems, and research area equipment. The reliability and stability of the utility grid in terms of outages, surges, and sags will factor into the final capacity and selection of the generator system. Generators will be housed in a dedicated service area away from sensitive areas of the building, to minimize noise and vibration issues. The system will include 30% spare capacity for future load growth. The fuel capacity will be a minimum of 72 hours of continuous operation.

The building will be equipped with two closed transition automatic transfer switches for life safety and non-life safety loads, as required by the CEC. If a fire pump is required, a third dedicated transfer switch will be installed for this load. Provisions will be incorporated for a portable load bank connection. This will help facilitate required testing and a portable generator connection if a generator fails or must be removed from service for maintenance. All transfer switches will be complete with bypass contactors so that the power to the load can be maintained in the event of a switch failure.

9.3.1.5 UPS System

Critical areas of the TSTS Hub facility will require redundant (N+1) sources of uninterruptible power supply (UPS), such as critical labs, building automation, equipment, security, life safety, and communication system loads. UPS units will be sized for this facility and will include an additional 30% capacity for future load growth. Each UPS will also be equipped with static bypass to allow manual override in the event of equipment failure.

The UPS will be hot swappable, to enable live replacement without interrupting power to the connected loads. The UPS systems will be designed to sustain critical loads for 30 minutes and will act as a filter for power conditioning to protect sensitive infrastructure from the instability of the normal and emergency power sources. The design should also account for maintenance bypass capability.

9.3.1.6 Electrical Distribution

Power will be distributed throughout the facility at 347/600 V and 120/208 V. Where required for identified specialty equipment, 277/480 V will be provided. Step-down, K-13-rated high-efficiency transformers will be provided in the electrical rooms. Major HVAC and equipment loads will be serviced at the higher supply voltages. Lighting and receptacle loads will be mostly serviced at 120/208 V.

Areas like the high bays may utilize 347 V lighting to account for the long run lengths of the circuits. Separate panel board systems will be provided for lighting, receptacles, and HVAC. Dedicated step-down transformers will be provided for laboratory equipment operating at non-standard voltages.

Electrical rooms will be stacked vertically where feasible, to allow conduit shafts to run through all floors. Main distribution panels in each room will be connected via conductors in conduit or bus duct.

Surge protection will be provided for the main transformer, all switchboards, MDBs, and CDPs. Dedicated surge protection devices will be provided for specific critical and/or expensive equipment, as determined during the design phase.

9.3.1.7 Grounding

A building electrical grounding system will be distributed throughout the building. Grounding and bonding systems will be designed in accordance with the in progress RLDF and the CEC. A technical/communications bonding system will be provided for the entrance facility room, main communication room and distributed telecommunication rooms. A dedicated ground grid will be provided and will be accessible for future testing via service access points.

9.3.2 SPACE REQUIREMENTS

All rooms will be sized with capacity for future growth. The approximate space requirements for the electrical distribution equipment are described as follows. All rooms sizes will be confirmed in the next stage of design.

- **Main electrical room**: 6 m × 9 m, or as required to suit final equipment selections with at least 25% spare space.
    - This will house the main incoming electrical service and distribution equipment that will feed all the sub-electrical rooms in the building.
- **Main server room**: 5m x 10m, or as required to suit final equipment selections with at least 25% spare capacity.
- **Entrance facility room:** 5 m × 10 m.
    - This will house the incoming telecommunications backboards and distribute it to the main communications room.
- **Main communications room**: 5 m × 10 m.
    - This will house the core telecommunications equipment and corresponding infrastructure. It will serve as the hub for all the sub-data rooms throughout the building.
- **Main UPS room**: 6 m × 4 m.
    - This will house the UPS and its associated distribution. It should be close to the laboratory spaces, where it will be highly used.
- **Multiple sub-combination electrical rooms/telecommunication rooms**: 3 m × 3 m and 3 m × 4.5 m.
    - These will be separate rooms with individual doors, but they will be located next to each other.
    - The electrical rooms will house required transformers and branch circuit panels for feeding local circuits.
    - The data rooms will house the data racks for the local data infrastructure.
    - The rooms will be on the same floors as the equipment they serve. If the building is designed with multiple levels, the rooms will be stacked on top of each other on a floor-by-floor basis.
    - The rooms will be dispersed throughout the building, approximately one for every 1,000 SQM of floor space.

  - Priority should be given to locating the sub-electrical rooms close to the heavy electrical load areas (e.g., offices, lab spaces, workshops, and high bays).
- **Indoor generator room**: 10 m × 5 m.
  - The generator room size will be confirmed as the design progresses.
  - This room is best located on an outside wall, close to the main electrical room and mechanical rooms. Alternatively, the generator system could also be located outdoors in a weathertight enclosure. Site configuration will play into this decision, as there is not much space on-site.

9.3.3 LIGHTING AND LIGHTING CONTROL

9.3.3.1 Interior Lighting

The lighting throughout the building will be designed using LED technology, unless the specific application requires an alternate technology. This will allow the TSTS Hub facility to meet recommended lighting levels as prescribed by the Illuminating Engineering Society (IES) and meet the energy targets required by the NECB. Discussions with the users have revealed the need for better-lit spaces that will increase the visual comfort of the occupants.

9.3.3.2 Interior Lighting Controls

The building will be equipped with a central, low-voltage lighting control system that will monitor and adjust lighting throughout the day with sensors and switches. Unless specific spaces require a different approach, all spaces will be equipped with occupancy and/or vacancy sensors, and all areas with access to natural daylighting will use photo sensors and luminaires with dimmable drivers. Where occupancy or vacancy controls are not appropriate due to impact on the room’s function or occupant safety, a scheduling program will be considered for on/off switching outside working hours.

The central, low-voltage lighting control system can be used to implement other lighting energy savings approaches (e.g., high-end trimming or tuning where the controls will limit the output to a maximum lighting level, typically around 80% output). Integration with motorized window blinds will be included for larger areas with solar exposure. The lighting controls will be integrated with the intelligent building infrastructure so that occupancy data can be shared. This will allow heating and cooling systems to ramp up or down depending on usage. This integration will also include manual overrides.

9.3.3.3 Exterior Lighting

The exterior of the building will be controlled from the centralized system using exterior photocells and time-of-day programming. The lighting control system will be integrated with the building management system.

Exterior lights will provide the adequate illumination level required by the building code, with light locations, orientation, and accessories selected to minimize light trespass. Minimum light levels around the building and parking areas will meet or exceed IESNA-recommended levels and will meet the typical close circuit television (CCTV) light level and site security requirements outlined in the TRA (see **Section10**).

Pole-mounted outdoor lighting will be provided for large open areas. Façade-mounted lighting will be provided for perimeter security.

9.3.3.4 Emergency Lighting

Emergency and exit lighting will be provided in accordance with the NBC 2015 requirements. Emergency lighting will be supplied from the building generator plant. Select areas will use battery backup to ensure uninterrupted illumination during generator start-up. Emergency lighting will be provided in select lab and equipment areas, as per user requirements.

9.3.4 FIRE ALARM

The building will be equipped with a complete, fully addressable two-stage fire alarm system. The system will use speakers for audible communication rather than horns or bells, so that it may act as a mass notification system if required. Visual signalling devices will use strobes of differing intensities installed throughout the building.

9.3.5 IM/IT

Several dedicated networks are required for both the TSB and the NRC SMPL. These detailed network requirements are still being discussed and will need to be addressed in the next phases. Network and Space design is to follow the Government of Canada Workplace Fit-Up – Special Technical Standards Guidelines. The facility entrance room will be the distribution centre for the data infrastructure.

The existing site (the main hub being building M-3) has a single-mode and multimode fiber optic network cable distribution system. Exact details of where this building connects to the network will be developed during the Schematic Design Phase. The network will be brought into the facility entrance room and distributed to the server room and the telecommunication rooms. Each telecommunication room is currently sized to accommodate three dedicated racks. During future design stages, FW will determine the dedicated networks required by different areas of the building. For efficiency and flexibility, it is recommended that the independent networks have specific dedicated switches. However, they may also share rack spaces in the telecom rooms if required and upon approval.

CAT6A structured cabling infrastructure will be incorporated throughout the TSTS Hub facility to meet the data, voice, and building system requirements. Cable tray systems will be included in the design throughout the building and sized to allow for ease of installation and future capacity. The backbone cabling subsystem will consist of backbone copper and fiber cables. The minimum requirements are 6x Cat6A cables for copper backbone and thirty-six (36) strands of single mode and/or multimode fiber, depending on run length. IT infrastructure is the responsibility of SSC, Shared Services Canada.

Wireless Local Area Network (Wi-Fi) will be included in the design throughout the facility, to support Day 1 processes and equipment (e.g., notebook computers) and to provide future flexibility. The Wi-Fi system will use telecommunication horizontal pathways to access points (AP) throughout the facility. The exact placement of APs should be determined by a heat map during detailed design. However, an approximate minimum spacing of 15 m × 15 m should be implemented, to ensure coverage for both the 2.4 GHz and 5.0 GHz frequency ranges.

In coordination with local cellular providers, a distributed antenna system (DAS) should be provided with full coverage in the facility and throughout the site. The following frequencies should be provided:

- CELL cellular/trunked mobile
- LTE mobile broadband services
- Local emergency responder (i.e., fire, police, and ambulance)
- 5G cellular networks should be considered based upon rollout of the technology.

Video conferencing should be provided in all meeting rooms. The audio visual (AV) system design should include microphones, video cameras, and video monitors. Lighting systems and sound attenuation structures/materials should be given special consideration, to optimize the performance of the video conferencing systems.

In accordance with GCworkplace, a sound masking system should be provided to suit open office layouts as required. The system will be in addition to and not detract from prioritizing passive sound attenuation strategies in the building. If a centralized sound masking system is specified, the head end equipment should be in the local telecommunications room. If local sound masking is specified, infrastructure should be in the ceiling space of the area served.

9.3.6 SYSTEMS INTEGRATION

All major electrical and communications systems will integrate with the overall intelligent building infrastructure, including security systems, access control, fire protection systems (e.g., fire alarm and fire pump), automatic window blinds, renewable energy systems, lighting controls, and electronic metering.

9.4 PRELIMINARY CIVIL ENGINEERING RECOMMENDATIONS

The civil engineering component of the project includes identifying the standards, policies, and guidelines required by the local municipality to support site development and the application process. Additional development considerations and information may be required by local municipality, depending on the size and complexity of the proposed development. The engineering and environmental requirements that support the site selection and application process are identified in the following sections.

9.4.1 ENGINEERING

9.4.1.1 Zoning Amendment

Depending on the location of the site, a zoning review and amendment may be required.

9.4.1.2 Assessment of Adequacy of Public Services/Site Servicing Study/Site Servicing Plan

Existing public services must be evaluated to confirm that they can adequately service the site. Local servicing guidelines include stormwater management, watermain, and sanitary sewer requirements. A hydraulic watermain analysis and preparation of servicing options should be completed to address fire protection requirements, site water, and sanitary needs, based on local and provincial requirements.

The report should address requirements and recommendations for sewage and water services, to ensure an acceptable quantity and quality of water supply and the proper collection, treatment, and disposal of sewage wastewater for the site. Development servicing studies will define the water, sanitary, and stormwater services required for the site, based on the following provincial and municipal requirements/guidelines:

- Watermain requirements, including fire protection within the building and fire hydrants on site.
- Sanitary sewer requirements, connection to existing system, and potential for on-site treatment requirements.
- Stormwater requirements, including the sizing of the system, quality, and quantity controls.

9.4.1.3 Stormwater Management Plan/Brief

The Stormwater Management Plan (SWMP) will meet the criteria established to ensure that:

- Groundwater and baseflow characteristics are preserved.
- Water quality is protected.
- Any watercourses present do not undergo undesirable and costly geomorphic change.
- There will not be any increase in flood damage potential.
- An appropriate diversity of aquatic life and opportunities for human uses are maintained.

Stormwater management strategies that employ a combination of SWMPs are desirable because they yield the following benefits:

- More effective stormwater management.
- Reduction in land area required to implement end-of-pipe solutions.
- Enhanced opportunities to integrate SWMPs effectively as amenities.
- Decreased total cost when land value is factored in.
- Increased level of public awareness and involvement in the implementation and management of stormwater management initiatives.

The SWMP approach will include site-level and conveyance controls. These controls can be divided into two categories based on their primary function: storage controls and infiltration controls. Storage controls include:

- **Rooftop storage:** restricting the discharge rate from roof drains to provide rooftop detention of stormwater.
- **Parking lot storage:** implementing catch basin restrictors or orifices in the storm sewer to detain stormwater on parking lots.
- **Superpipe storage:** oversizing storm sewers and implementing orifices in the sewer to create pipe storage.
- **Site storage:** implementing catch basin restrictors to create additional storage.

9.4.1.4 Community Transportation Study and/or Transportation Impact Study/Brief

These studies address on-site and off-site measures to align the transportation system's performance with the local municipality's goals. They support the local municipality and site development goals of creating an integrated land use and transportation system identified in the local Official Plan and Transportation Master Plan by doing the following:

- Evaluating the consistency of a proposed development's transportation characteristics with municipal goals and policies.
- Comparing transportation network performance around the site before and after development and evaluating the impact on adjacent roads.
- Enabling negotiations between the local municipality and site owner regarding sharing costs for transportation system modifications.

As part of this study, transportation demand management (TDM) requires proponents to assess the context, need, and opportunity for TDM measures as part of the site development. This will include development of a TDM program and management through a program coordinator. The TDM plan will address parking needs, walking, cycling, transit, ridesharing, carsharing, and bike sharing.

9.4.1.5 Composite Utility Plan

A Composite Utility Plan must adhere to the local municipality's guidelines.

9.4.1.6 Erosion and Sediment Control Plan

An Erosion and Sediment Control Plan will be required to address construction and site impacts on the adjacent environment.

9.4.1.7 Geotechnical Study

A report prepared by a qualified geotechnical engineer addressing the geotechnical aspects of the site will generally be required as part of the site development process.

The report should address the geotechnical design requirements for the subsurface conditions at the site, to support the planned structures, roadways, utilities, and any other infrastructure. The Geotechnical Report can also establish limitations on the site grading and structural requirements, which may be critical to the design of services, roadways, and structures.

As part of this component and depending on the site characteristics, the local municipality may also require a Slope Stability Study.

9.4.1.8 Grade Control and Drainage Plan

A Grade Control and Drainage Plan must outline the criteria for the site development, including stormwater management.

9.4.1.9 Hydrogeological and Terrain Analysis

A Terrain Analysis and Hydrogeological Report or an assimilation capacity study will be required, in accordance with Environmental Protection Act and Ontario Water Resources Act. These studies aim to demonstrate that the development will not have adverse effects on the environment or public health.

9.4.1.10 Noise/Vibration Study

Noise impacts must be assessed, and recommendations will be prepared in accordance with the Ministry of Environment noise guidelines and the local municipality's environmental noise control guidelines.

9.4.1.11 Landscape Plan

A Landscape Plan will be required as part of the site requirements.

9.4.2 ENVIRONMENTAL

9.4.2.1 Archeological Assessment

Archeological assessments determine whether there is a potential for the site to contain archaeological sites. A Stage 1 archaeological assessment, and potentially a Stage 2 archaeological assessment, may be required, depending on whether archaeological potential is present.

9.4.2.2 Cultural Heritage Impact Statement

A Cultural Heritage Impact Statement may be required, depending on site features/structures.

9.4.2.3 Environmental Impact Statement

An Environmental Impact Statement evaluates the potential environmental impacts of the proposed project. It documents the existing natural features on and around the proposed site, recommends ways to avoid and mitigate negative impacts, and proposes ways to enhance natural features and functions. As part of this study, endangered and threatened species, wildlife, and natural environment are considered.

9.4.2.4 Phase 1 and Phase 2 Environmental Site Assessments

A Phase 1 Environmental Site Assessment, and potentially a Phase 2 Environmental Site Assessment, will be required as part of the evaluation of the proposed site.

9.4.2.5 Environmental Impact Statement

The fuel storage tank system associated with both the science equipment and the generator system (>2500 L) must adhere to the Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations (SoR/2008-197). This must include space to design a product transfer area, to contain spills during the transfer process.

10.0 SECURITY

Security is a critical component in the function and operation of any building. In partnership with the participating Hub Partner security representatives, the LabsCanada Security Team is responsible for delivering four major deliverables during the Functional Programming phase: Preliminary Security Requirements (PSR), Security Space Requirements (SSR), Room Data Sheet (RDS) Security Input and a Threat and Risk Assessment (TRA). Additionally, a Security Design Brief (SDB) is provided between the Functional Programming and Schematic Design phases. The outcomes and recommendations of these deliverables will drive the Electronic Security System (ESS) and Physical Security Solutions designs for the facility.

10.1 SECURITY MANDATE

To ensure the new laboratories are designed and operated with the application of robust, modern security standards that are flexible and scalable to meet new and emerging threats and enable the safety and security of occupants and assets.

Defining Characteristics

- Achieve compliance with GoC security policies and directives.
- Protect the people working at and visiting the facilities.
- Protect the facilities and their assets from internal and external threats (research, data, equipment, and resources essential to the mission of the facility).
- Provide security infrastructure that is robust, flexible, and scalable to meet emerging threats.

10.2 PRELIMINARY SECURITY REQUIREMENTS (PSR)

The purpose of the Preliminary Security Requirements (PSR) document is to inform the early development of Functional Programing with high level security requirements for the building, based on the planned operations and client occupants of the site. The document is preliminary and based on existing government security policies and standards and introductory client workshops. Topics include: Purpose, Scope and Assumptions, Limitations, Security Objectives, Site Security Considerations, Building Envelope Security Considerations, Building Interior, Security Zoning, Security Systems, Supporting Security Operations and References. The PSR is delivered in its entirety during the Master Programming phase.

10.3 SECURITY SPACE REQUIREMENTS (SSR)

The purpose of the Security Space Requirements (SSR) document is to identify and describe the security space requirements for the site and building. These space requirements are used to inform Functional Programming with high level space descriptions by function and operational requirements. Topics include the following spaces, as appropriate: Gates and Guard Huts, Parking, Guard Posts, External Security Storage, Primary and Employee Entrances, Lobbies, Security Reception Desks/Visitor Registration Desks, Screening and Scanning Areas, Interview Rooms, Security Administration Areas (e.g., Enclosed Offices, Workstations, Personnel Security Processing Areas, File Rooms, Storage Rooms, Fire Alarm Panel Monitoring Areas, Loading Docks, Break Rooms, Security Control Centres, Crisis Management Centres, Security Equipment Rooms, Special Discussion Areas and any other spaces managed, operated or occupied by security personnel. The SSR is delivered in its entirety during the Master Programming phase.

10.4 ROOM DATA SHEET (RDS) SECURITY INPUT

Using information gathered from participation at the Functional Programming Workshops and the Room Data Sheets themselves, the LabsCanada Security Team has produced the Security discipline section for each RDS. This separate "RDS Security Input" document contains the Security Applications and Interior Zoning for each room. Security input is provided in tabular form and includes: Room Name, Interior Zoning designation and Security Applications, along with informative notes as required.

10.4.1 SECURITY APPLICATIONS

Security Applications address mitigations such as, but not limited to: Access Control, Security Video, Security Intercom, Intrusion/Duress Alarms, Speech Privacy, Blast Applications, Ballistic Treatments, Chemical-Biological-Radiological-Nuclear (CBRN) Monitoring, Metal Detection, X-ray Scanning and Emission Security (EMSEC) Mitigations.

10.4.2 INTERIOR ZONING

The Security Zone concept consists of the Public Zone, Reception Zone, Operations Zone, Security Zone, and High Security Zone and follows the "RCMP G1-026 Guide to the Application of Physical Security Zones". Taken into account for the selection of the zone for each RDS is the space type, blocking and stacking (if available) and functional programming options.

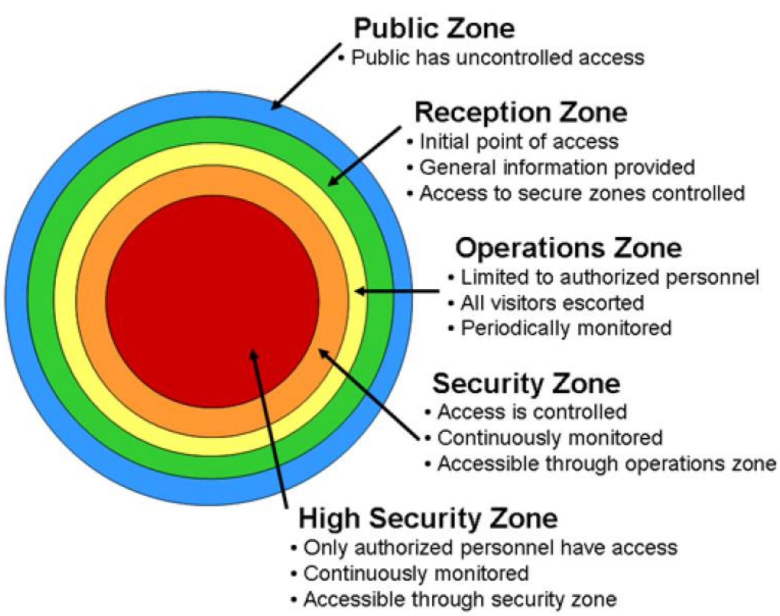


Figure 10.1: Security Zone Concept (Royal Canadian Mounted Police, 2020)

10.5 THREAT AND RISK ASSESSMENT (TRA)

The Threat and Risk Assessment (TRA) is a critical element in an organization’s physical security strategy. The purpose of the TRA is to provide a description of assets, an assessment of threats, a review of existing protective mechanisms and vulnerabilities, the computation of risk and the and the proposal of mitigation measures. The development of the TRA is based on the Harmonized Threat and Risk Assessment (HTRA) Methodology published by the Royal Canadian Mounted Police (RCMP) on October 23, 2007. A set of recommendations has been extracted from the TRA and incorporated during the Detailed Functional Programming phase.

10.6 SECURITY DESIGN BRIEF (SDB)

The Security Design Brief (SDB) provides the physical security concept and proposed mitigation measures developed in response to the Threat and Risk Assessment (TRA). The SDB will also build on the Preliminary Security Requirements (PSR) and Security Space Requirements (SSR) deliverables. The SDB addresses Site Conditions, Building Layout and Features, Special Requirements, Integrated Security Systems, Facility Management, Storage, and Security Personnel. The SDB is delivered just before the start of the Schematic Design phase and is incorporated into the Concept (Schematic) and Detailed Designs.

11.0 FUNCTIONAL PROGRAMMING OPTIONS

The optimization of the functional program must address the science space areas, including workflows, lab adjacencies, space sharing, and the approach to the science operations conducted in those spaces. Additionally, science support spaces will be considered (i.e., spaces that support program functions, such as resource centres, auditoriums, shared meeting rooms, shared offices, and outdoor spaces that support the science facility operations). During the functional programming phase, meetings were held with TSTS Hub, Hub Management Office, Laboratories Canada, FW team and External Reviewers to discuss and develop optimization strategies for the project which resulted in the document “What We Heard Report”. Topics that were discussed among this group included Innovation and Attracting Talent, Collaboration, Flexibility and Workflows. Key takeaways were identified to further define design objectives for the facility including flexibility of work environments, adjacencies and visual connections, sustainability goals, modularity, collaboration, sharing and adaptability.

Opportunities for optimization of functional programming options include:

1. Optimize the sharing of science spaces to achieve an ideal integration of science functions with similar mandates, promote science equipment sharing, and reduce the need for redundant infrastructure.
2. Identify opportunities to maximize different space type adjacencies that can achieve the requirement of adaptability over time.
3. Consider the programming of space to reflect forward thinking and opportunities for science changes/trends that may influence future space requirements.
4. Identify additional opportunities for flexibility and future expandability to support the TSTS Hub Science Vision long-term.
5. Identify opportunities for program space area reductions, circulation efficiency, new technologies, digital storage/connectivity, and time overlaps of space use.
6. Identify opportunities for reducing building systems, including mechanical rooms and shafts, electrical and IT rooms, structural depths, and building envelope thicknesses.
7. Identify options for relocating certain program functions, including outdoor storage, staging areas, loading areas, and site parking.

11.1 BASELINE OPTION: TOTAL AREAS ANALYZED, INCLUDING CONSIDERATION OF COLLABORATION AND SHARED PROGRAMMING THAT ALIGN WITH LABORATORIES CANADA PRINCIPLES

The programming process considered collaboration, amalgamation, and the consolidation of space and equipment to align with the Laboratories Canada principles. The net area and gross area totals noted in **Section 4.2** are the baseline areas.

The functional program area for the science spaces component includes the high bays, workshops, laboratories, laboratories support, and logistic support space. A total net area of 7,708.66 SQM is projected for this program component; the program spaces were developed with user group input to verify space requirements. This project program space requirement is understood to be maintained for a baseline comparison.

The science office accommodation component of the functional program includes offices, open workstations, collaboration rooms, meeting rooms, kitchenettes, and SPSs. The science office accommodations were developed with user group input to verify the space requirements. This program's net area is determined to be 1,118.30 SQM and is understood to be maintained for a baseline comparison.

The TSB HO component of the functional program includes offices, open workstations, collaboration rooms, meeting rooms, kitchenettes, and file storage. The HO has been developed with user group input to verify space requirements. This program net area is determined to be 1,392.00 SQM and is understood to be maintained for baseline comparison.

The shared public spaces of the functional program include the lobby, auditorium, boardroom, training rooms, resource centre, lunchrooms, server, and computer rooms. This program net area is determined to be 1,157.00 SQM and is understood to be maintained for a baseline comparison.

The outdoor requirements component of the functional program includes outdoor storage, container storage, a fuel farm and fuel storage, covered storage, a loading area, a garbage and recycling area, hard and soft landscaping, and parking. This area is determined to be approximately 11,465.00 SQM. Site circulation, utilities, and services will be considered in the final determination of this area. The parking area required includes185 parking stalls for staff based on user group requirements. The area for visitor parking is to be confirmed based on the requirements of the user group. The zoning by-law indicates that visitor parking does not need to exceed 30 stalls and space for 10 visitors is recommended.

11.2 FURTHER OPTIMIZATION OPTION: OPINION OF OPTIMIZATION, WITH ASSOCIATED RISKS HIGHLIGHTED

To develop an optimized functional program area, FW recommends that the areas for the science spaces should be maintained. Program areas that may be reduced or optimized include the science office accommodations, TSB HO, public spaces, Shared Client Spaces, and outdoor requirements.

There are several opportunities for area reduction that would help to optimize the programming. These opportunities have varying degrees of risks that must be addressed and weighted by the TSTS Hub, TSB HO representatives, and Laboratories Canada.

Potential optimization strategies with their benefits and potential risks are as follows:

- Reduce the overall office space component on the basis of future flexible work arrangements/increased teleworking. Reduction opportunities are based on the TSTS Hub and TSB HO/departmental work arrangements/teleworking capabilities. Determination for reducing office space must be developed and reviewed in more detail with the shareholder groups to assess viability. For example:

  - TSB HO: If 75% FTEs worked on-site and 25% were teleworking, this would result in a 210 SQM net space reduction. (The mobility factor and other efficiencies for the TSB HO will be further explored during the next phase of design to take into consideration lessons learned from the COVID-19 and its impact on the future workspace. The RPS External Mobility Assessment (EMA) tool will be used to guide this process.)
  - TSTS Hub: If 90% FTEs worked on-site and 10% were teleworking, this would result in a 100.50 SQM net space reduction.
  - Risks include:
    - Reduced accommodations for full capacity.
    - Reduced collaboration within the facility.
    - Reduced access to labs and science functions.

- Reduce the size of and/or eliminate some functions within the public spaces, such as the lobby, interpretive centre, kitchenettes, archives, and de-centralized resource centre. These reductions are partially related to the reduction of office space as described above. For example:

  - Reducing the lobby size by 15% would result in a 25 SQM net space reduction.
  - Reducing the interpretive centre by 15% would result in a 25 SQM net space reduction.
  - Reducing the de-centralized resource centre by 33% would result in a 15 SQM net space reduction.
  - Reducing the food service size by 21% would result in a 20 SQM net space reduction.
  - Reducing the wellness/first aid room by 50% would result in a 12 SQM net space reduction.
  - Risks include (dependent on spaces reduced/eliminated):
    - Reduced collaboration.
    - Reduced connectivity with community.
    - Reduced recruitment/retention of talent.
    - Reduced outreach capabilities/success under Science Plan Theme 3: Educating, Explaining, and Influencing.
    - Reduced resources accessibility and operational efficiency.
- Reduce the size or presence of spaces to support optimal functionality. For example:
  - Reduce staging and/or outdoor storage areas for high bay spaces. Conduct work staging and storage activities off-site or through scheduling. An outdoor storage area reduction would result in a net 320 SQM space reduction.
  - Space will need to be accommodated somewhere else; therefore, there are no benefits for the Crown.
  - Risks include:
    - Operational functionality will be reduced.
    - Additional off-site facilities will be required.
    - An increase in intermediate staging/holding on-site may be required.

- Reduce parking requirements through off-site or structured parking.

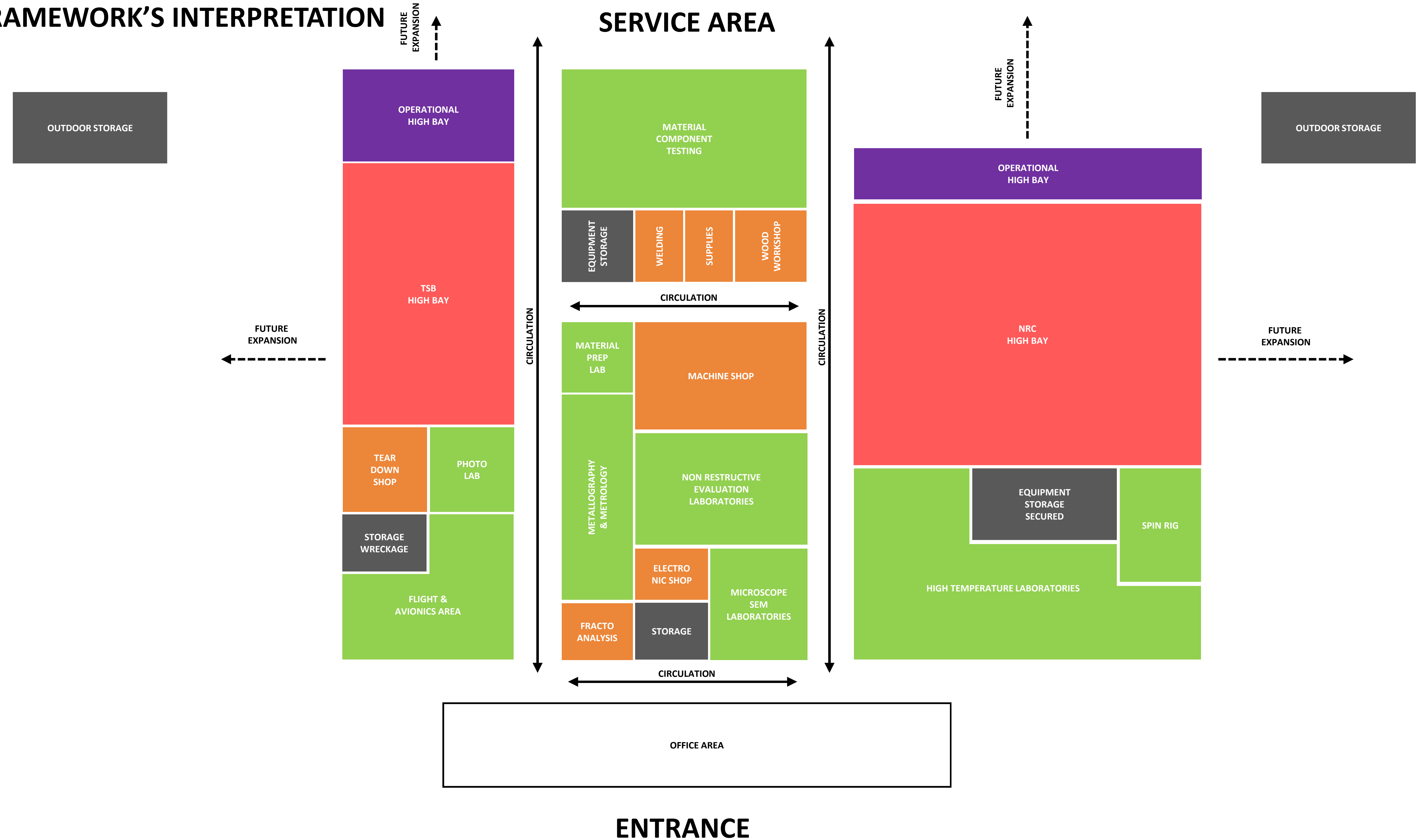
  - Accessible and visitor parking is required to be maintained near the facility main entrance to meet zoning by-laws and building codes.
  - A reduction of 100 parking stalls would result in a net 2700 SQM space reduction.
  - The result is overall parking space reduction on-site and a project schedule reduction.

  - Risks include:
    - Variance and agreement to be negotiated with the City of Ottawa and other potential stakeholders.
    - Inconveniencing staff and visitors to the facility.

- Additional opportunities should be explored and evaluated as the design progresses.

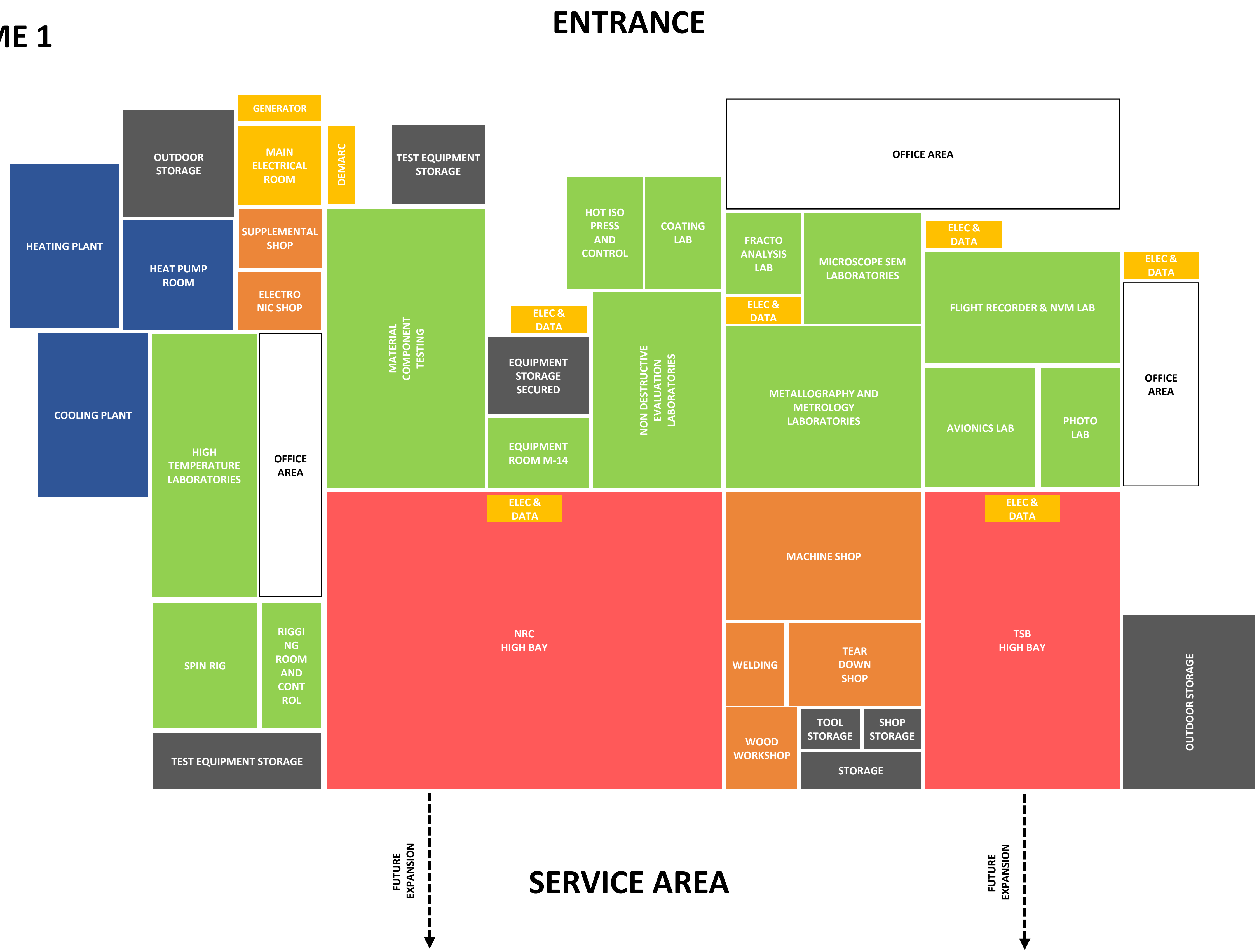
Appendix A PUZZLE EXERCISE OUTCOMES

FRAMEWORK'S INTERPRETATION

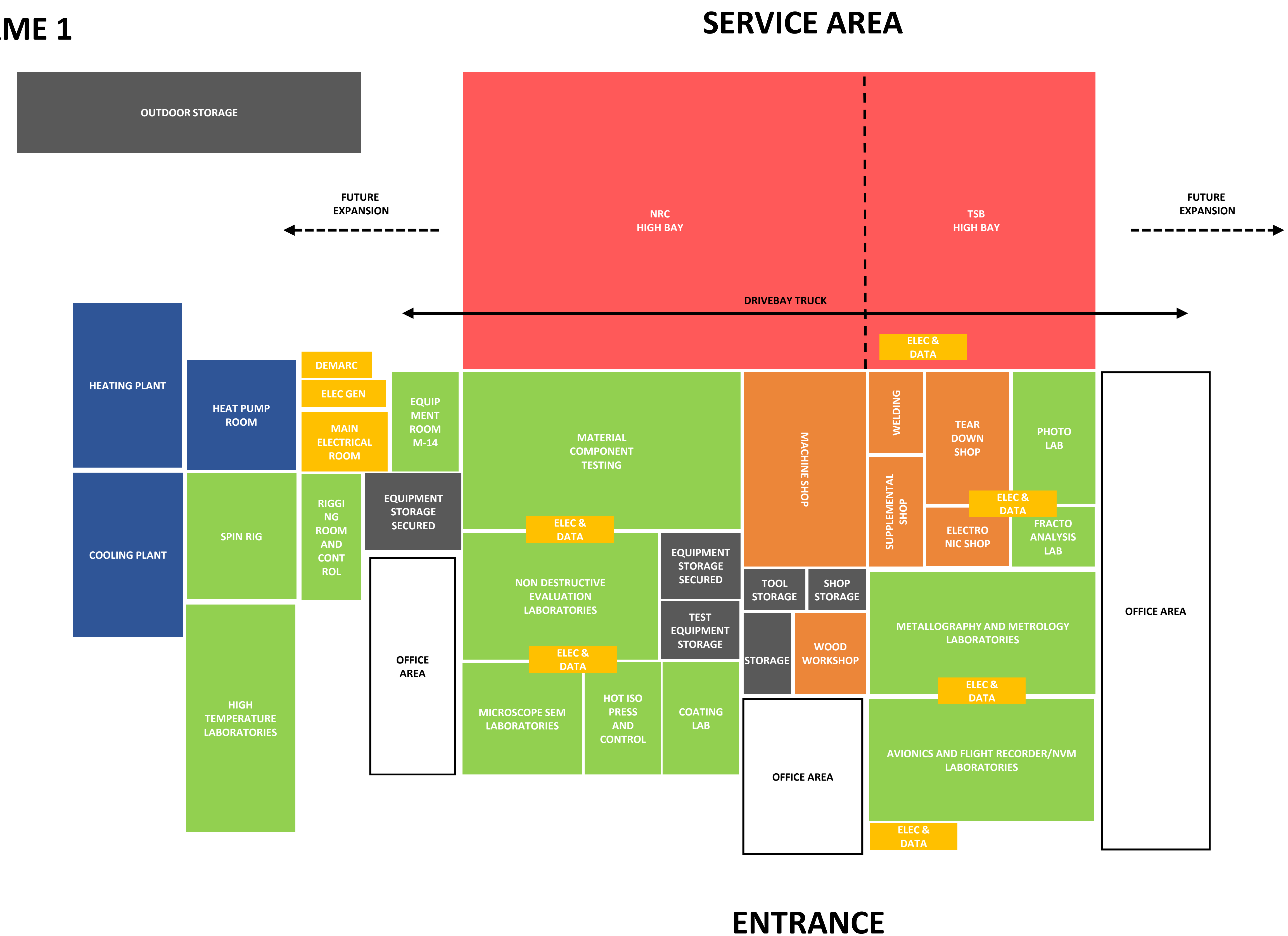


FRAMEWORK – A partnership of Stantec, Merrick, and DIALOG

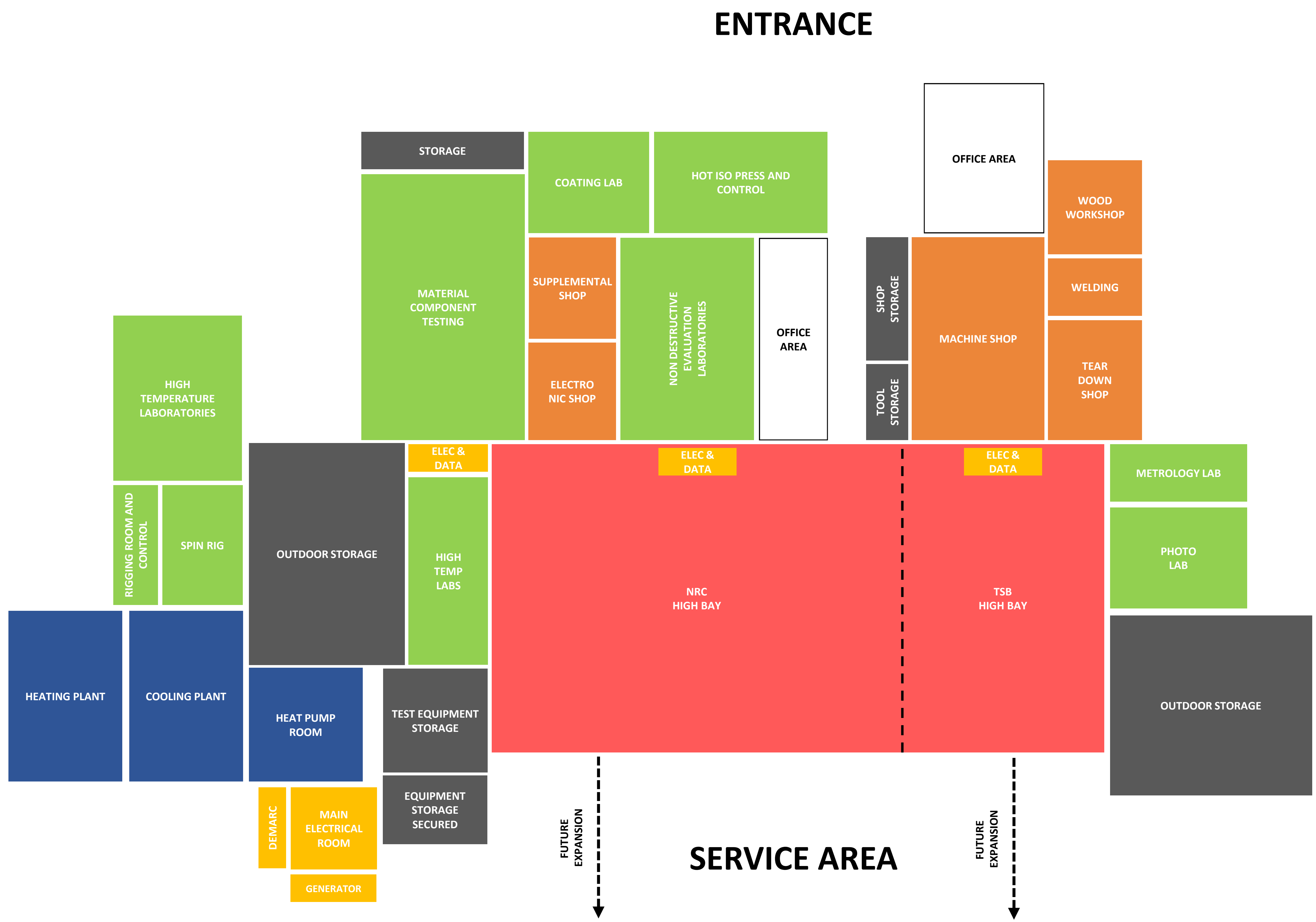
GROUP #1 – GAME 1



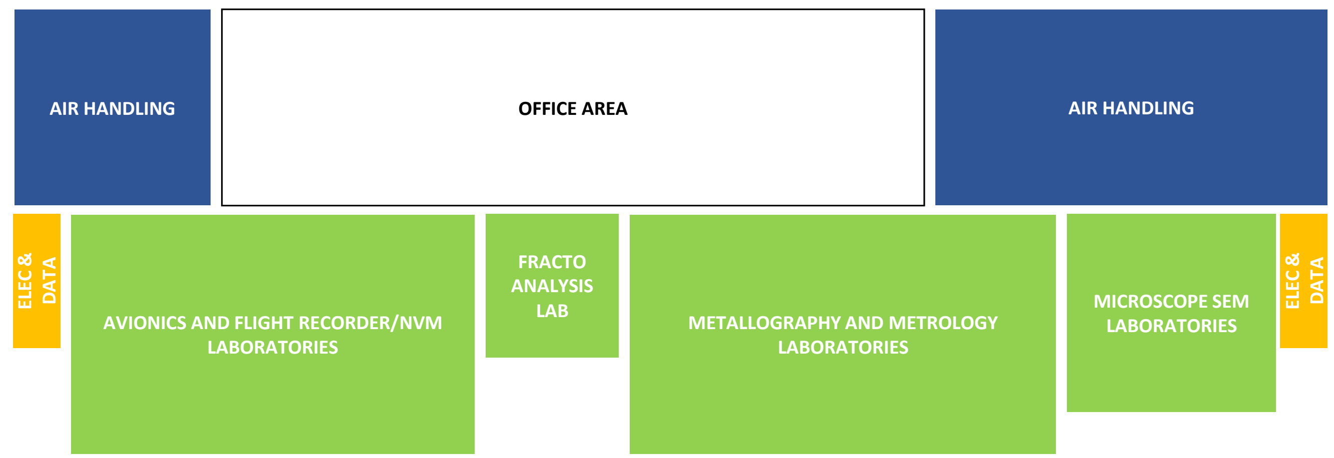
GROUP #2 – GAME 1



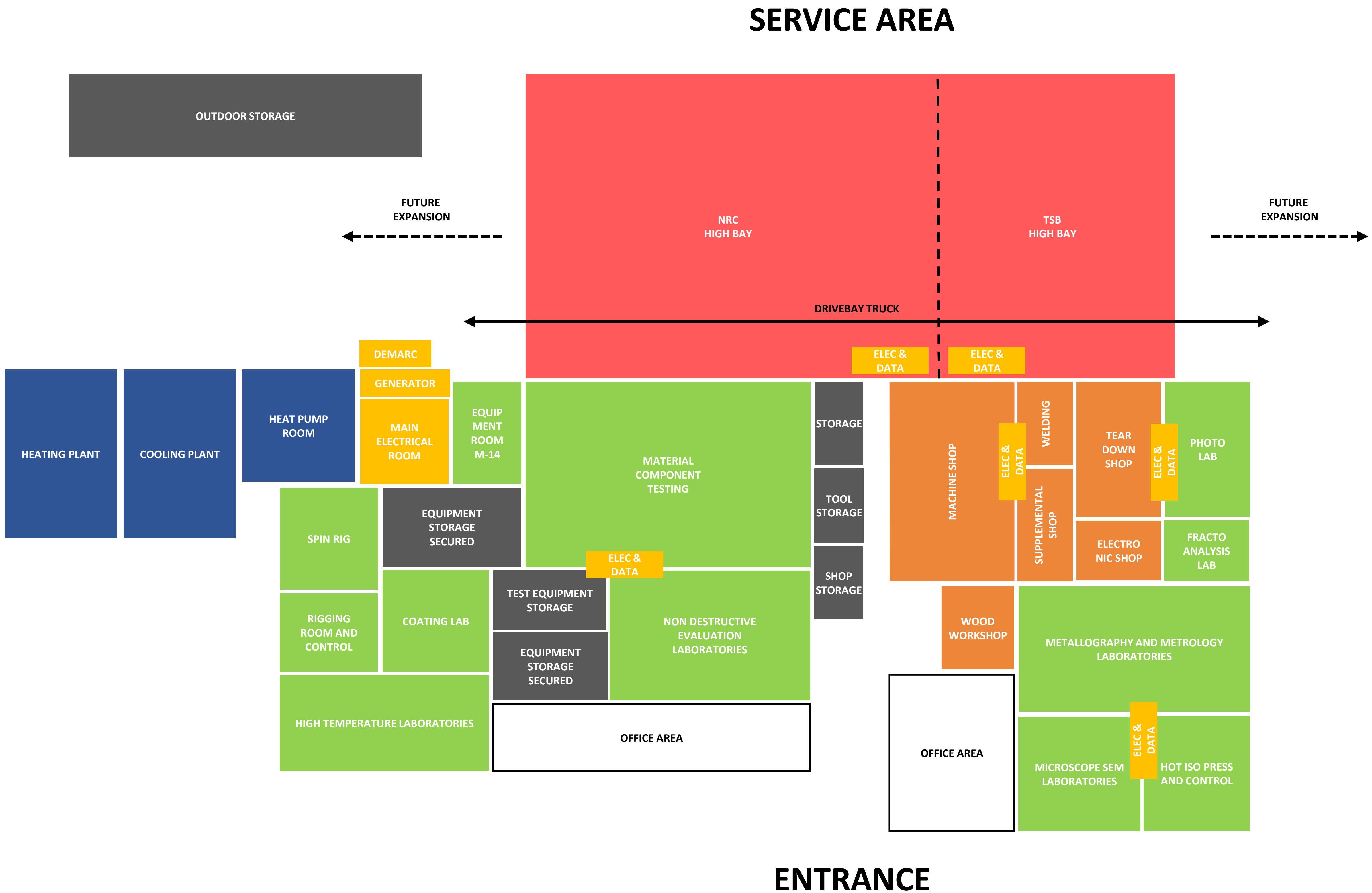
GROUP #1 – GAME 2 - GROUND FLOOR



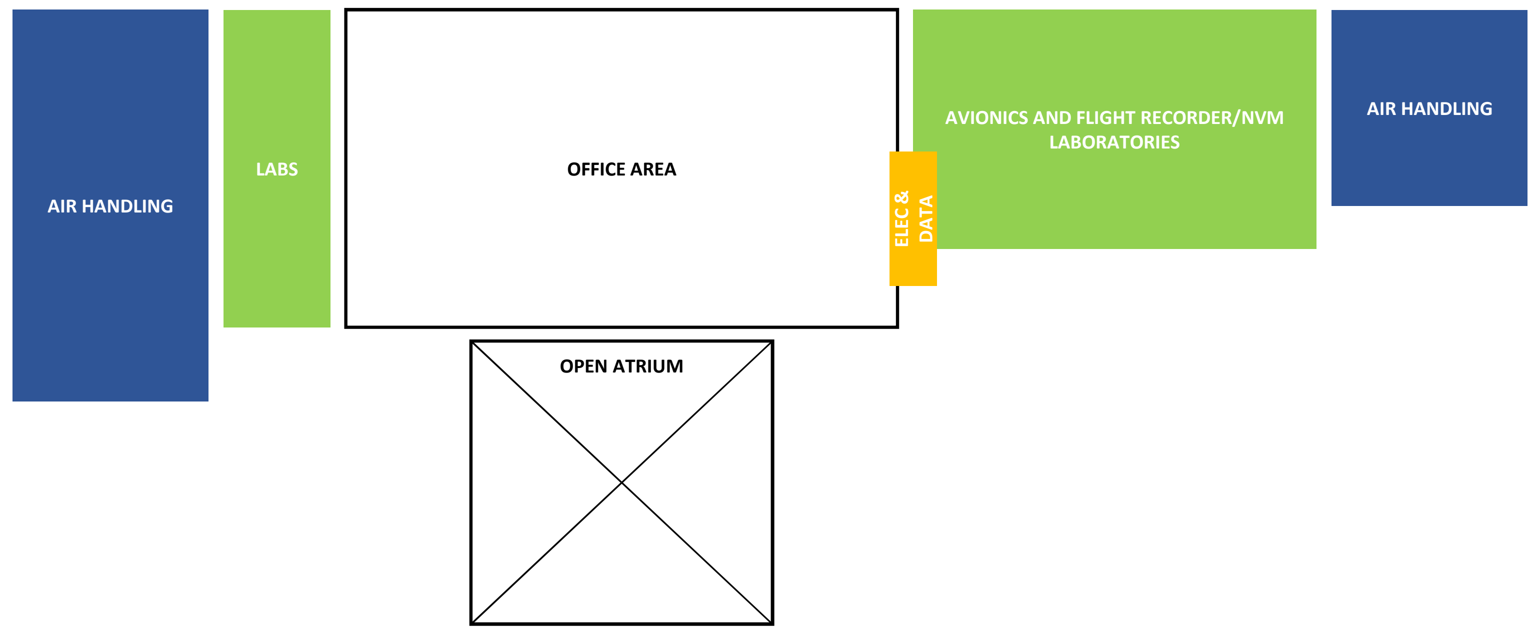
GROUP #1 – GAME 2 - UPPER FLOOR



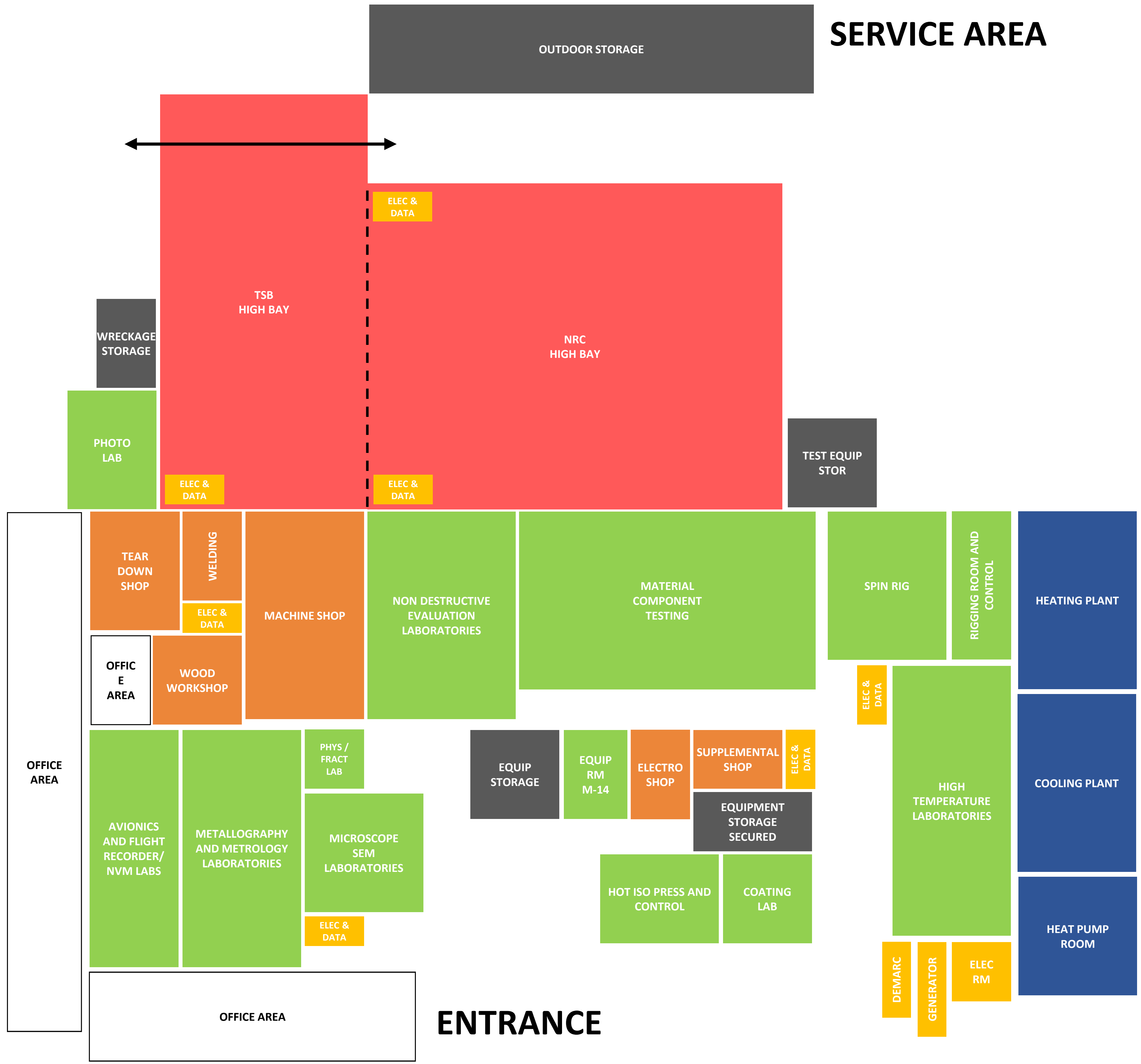
GROUP #2 – GAME 2 - GROUND FLOOR



GROUP #2 – GAME 2 - UPPER FLOOR



CONSOLIDATED GAME



FRAMEWORK'S INTERPRETATION

GROUP #1 – GAME 1

GROUP #2 – GAME 1

GROUP #1 – GAME 2 - GROUND FLOOR

GROUP #1 – GAME 2 - UPPER FLOOR

GROUP #2 – GAME 2 - GROUND FLOOR

GROUP #2 – GAME 2 - UPPER FLOOR

WORKSHOP #02 PHOTOS

Appendix B EQUIPMENT LIST

ID	REVIT Type ID	OLD Space Code (Building & Rm No.)	NEW Space Code	Name	Manufacturer (Make & Model)	Considered for Functional Program	Notes	Notes Other
1	E1	NRC-M10-GASTURBI	3.5 Spin Rig	JIB CRANE,GORBEL WALL MOUNTED ARTICULATING,2000 LB Transferred to M10 Gas Turbine 2017 [Might still be in M7]	HERCOLIFT MANUFACTURING LTD (S#1043870) Serial:	No	Part of spin rig facility	Jib crane to be replaced in new building.
2	0	NRC-M13-045	3.23 Material and Component Testing	NOVA STAR 5 5KW HEATER,1 YEAR	(S#1011653) Serial:100316	no	Equipment is usually placed into 19" x 36" deep x 22U rack or stood on edge on the floor on custom mounting legs. When in rack it occupies the rack footprint; outside of rack it occupies a	
3	0	NRC-M13-044	4.9 HTM Testing Equipment Storage	NOVA STAR 7 7.5KW HEATER,1YR	AMERITHERM INC. (S#1011653) Serial:100318	no	Equipment fits in footprint of test frame unit cell. Equipment requires process cooling water minimum 1 GPM, 60 psi.	
4	E2	NRC-M13-162	3.10 Hot Isostatic Press	FURNACE, HEAT TREATING, ELECTRIC. MOLYBDENUM, ASEA	AUTOCLAVE ENGINEERS INC. (S#1017825) Serial:	YES	Uses vacuum pump. Requires 2" exhaust to outside. Outside exhaust is used for pressure relieve and is quite loud 110 dB+. Part of ID 16.	Self contained room with pressure escape
5	E3	NRC-M13-146A	3.20 Microscope Lab	MICROSCOPE,INVERTED RESEARCH METALLURGICAL,m:PMG-3	OLYMPUS Co. (S#3005841) Serial:901609	YES	Requires installation on vibration suppressing table.	Passive Vibration Isolation Table, mod: SDP, Thorlabs, Inc
~~6~~	~~E4~~	~~NRC-M13-152~~	~~Not Assigned (Room not included in program)~~	~~MICROSCOPE,SCANNING ELECTRON,HITACHI,MODEL:S-570-1 - SURPLUS~~	~~(S#1017825) Serial:24-10~~	~~no~~		~~2x storage cabinets, chiller and equipment on UPS power. Primary work surface - top of oservation unit and extention cabinet. The chiller is connectedto building process water.~~
~~7~~	~~0~~	~~NRC-M13-152~~	~~Not Assigned (Room not included in program)~~	~~DEVICE,MICROSCOPE,SCANNING,SPECIMEN EXCHANGE,S-576 - SURPLUS~~	~~(S#1017825) Serial:~~	~~no~~		
8	E171	NRC-M13-044A	3.10 Hot Isostatic Press	DIFFSTAK C/W E2M2 MECHANICAL PUMP,MODEL:63/150M CANNING STATION PUMP	PSI PERIPHERAL SOLUTIONS INC. (S#1017825) Serial:2778	YES	Uses vacuum pump, furnace and requires cooling water for difussion pump cooling.	This equipment will either be located in 3.10 or in 3.9 depending on space. Move to 3.10. Overhead fume extraction hood needed in room 3.10 for welding fume extraction.
9	E5	NRC-M13-146B	3.22 Metallographic Sample Preparation	POLISHER GRINDER,C/W EUROMET IV POWER HEAD,ECONOME being replaced by new (aug 2018)	S#3005841,Serial:357ECF157/356URO151	YES	Requires compressed air, water supply, drainage with sediment trap.	4x Standard Storage cabinets for consumables.
10	E6	NRC-M13-045	3.23 Material and Component Testing	MECH. TEST. MACHINE SYSTEM A,MODEL:81(3005828)	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:NAE-7895	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack
11	E7	NRC-M13-045	3.23 Material and Component Testing	MECH.TEST.MACHINE SYSTEM B,MODEL:810	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:NAE-7889	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack
12	0	NRC-M13-045	3.23 Material and Component Testing	EXTENSOMETER AXIAL-632-56-01-005-076 WATER COOLED	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:646	no	Fits within frame footprint when installed; occupies 1.5'x1.5'x0.5' space in storage.	
13	E8	NRC-M13-045	3.23 Material and Component Testing	LOAD FRAME C/W CONTROL CONSOLE 810.A, ALIGNEMENT F	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:1485	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack
14	E9	NRC-M13-045	3.23 Material and Component Testing	NRC FRAME #1, FRAME 20,000 MTS.,MODEL:0900801	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:1129	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack
15	0	NRC-M13-045	3.23 Material and Component Testing	NRC FRAME #1, UPGRADE (AMR#6>4399-1)	MTS TESTING SYSTEMS (S#1000491) Serial:1129	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.	
16	E10	NRC-M13-162	3.10 Hot Isostatic Press	PRESS, ISOSTATIC HOT, ASEA BROWN BOVERI.	AUTOCLAVE ENGINEERS INC. (S#1017825) Serial:SL81-11592-1	YES	Uses vacuum pump. Requires 2" exhaust to outside. Outside exhaust is used for pressure relieve and is quite loud 110 dB+. Part of ID 16.	
17	0	NRC-M13-056	4.9 HTM Testing Equipment Storage	TEMPERATURE FATIGUE TESTING SYSTEM,HIGH T°,652-01D	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:98207	no	Grips small equipment. Fits inside frame footprint when installed on test frame.	
18	0	NRC-M13-045	3.23 Material and Component Testing	HIGH TEMP WATER COOLED AXIAL EXTENSOMETER C/W OPT	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:1049	no	Fits within frame footprint when installed; occupies 1.5x1.5x0.5 space in storage.	
19	E158	NRC-M13-045	3.23 Material and Component Testing	LOAD FRAME,2 COLUMN,22 KIP,P.O.#3105303612,m:318.1	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:111238	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack
20	0	NRC-M13-43	4.9 HTM Testing Equipment Storage	THERMOMETER (PYROMETER) INFRARED,2 COLOUR.,R-99C05	WILLER ENGINEERING LIMITED (S#1017825) Serial:208734	no	Fits in foot print of test frame when installed. Occupies 2x2x2 when in storage	
21	E138	NRC-M13-121	3.9 HTM R&D Lab	VACUUM FURNACE,BARBER COLEMAN MODEL IR77,INFRARED	(S#) Serial:108	YES	Requires 2" vacuum pump exhaust to outside. Requires extensive process cooling water flow for power supply and furnace chamber heat rejection. Requires compressed air.	Equipment footprint includes the furnace, the control system and power supply.
22	E159	NRC-M13-045	3.23 Material and Component Testing	LOAD FRAME, MTS 810.22E LOAD UNIT 22KIP & TESTAR C	MTS SYSTEMS CORPORATION (S#) Serial:	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack
23	0	NRC-M13-056	4.9 HTM Testing Equipment Storage	PYROMETER,IRCON MODLINE 3G SINGLE COLOUR PYROMETER	(S#1004409) Serial:IM3#5766	no	Fits in foot print of test frame when installed. Occupies 2x2x2 when in storage	
24	E11	NRC-M13-146	3.21 Metallographic Sectioning and Specimen Extraction	SAW, PRECISION, ISOMET 2000.	BLUEHLER LTD, USA.Mod11-480 (S#3021858) Serial:525-IST-1017	YES		4x Standard Storage cabinets for consumables
25	0	NRC-M13-56	4.9 HTM Testing Equipment Storage	FURNACE,MTS SINGLE-ZONE W/TEMPERATURE CONTROLLER.	MTS (S#) Serial:387167	no	Fits within frame footprint when installed; occupies 2x2x2 space in storage.	
26	0	NRC-M13-056	4.9 HTM Testing Equipment Storage	MTS THREE-ZONE CLAMSHELL FURNACE W/3-ZONE TEMPERAT	(S#) Serial:384242	no	Fits within frame footprint when installed; occupies 2x2x2 space in storage.	
27	E12	NRC-M13-150	3.19 SEM Lab	SCANNING ELECTRON MICROSCOPE, PHILIPS XL 30S FEG	PHILIPS ELECTRONICS OPTICS CA (S# 3010141) Serial:D1180	YES	An air supply with a pressure of 4-6 Bar must be connected to the microscope to operate pneumatic system. Also separate nitrogen supply with pressure of 1.2 Bar is required to vent the microscope chamber. SEM /Supplier/Service provider must be consulted in regards with limits for: -external magnetic field ; mechanical vibrations; -acoustical noise	2x storage cabinets, chiller and equipment on UPS power (230 VAC 1Ph, >20 A, UPS). Primary work surface - top of oservation unit and extention cabinet. The chiller is connected to building process water.
28	0	NRC-M13-150	3.19 SEM Lab	DEFLECTOR FOR PHILIPS XL 30S FEG SCANNING MICROSCO old bc 228268	PHILIPS (S#1038089) Serial:D1180	YES	Part of ID 27	
29	0	NRC-M13-150	3.19 SEM Lab	SEM/EBSD upgrade of $200K(AUC#800000002274) Linnuo Zhao	(Linnuo Zhao) PHILIPS ELECTRON (S#) Serial:D1180	YES	Part of ID 27	
30	0	NRC-M13-045	3.23 Material and Component Testing	CLAMSHELL FURNACE MODEL 652.01,3 ZONE TEMPERATURE	(S#) Serial:398097	no	Fits within frame footprint when installed; occupies 2x2x2 space in storage.	
31	0	NRC-M13-056	4.9 HTM Testing Equipment Storage	CONTROLLER,MTS 407,DC CONDITIONER (407.12)	(S#) Serial:433990	no		
32	E13	NRC-M13-045	3.23 Material and Component Testing	810 MATERIALS TESTING SYSTEM COMPLETE WITH/LOAD	MTS TESTING SYSTEMS (S#1003151) Serial:421135	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack
33	0	NRC-M13-056	4.9 HTM Testing Equipment Storage	FURNACE, MODEL 653.04,1400/100°C W/T° CONTROL	MTS SYSTEMS (S#1009137) Serial:1058426	no	Fits within frame footprint when installed; occupies 2x2x2 space in storage.	
34	0	NRC-M13-050	4.9 HTM Testing Equipment Storage	TESTSTAR CONTROLLER	INTERTECHNOLOGY INC. (S#) Serial:1020806	no		
35	0	NRC-M13-045	3.23 Material and Component Testing	GRIP,FACE,TESTING INST.,MTS MODEL 680.01B,2000 LB	MTS SYSTEMS CORPORATION (S#) Serial:1001743	no	Fits within frame footprint when installed; occupies 2x2x2 space in storage.	
36	0	NRC-M13-045	3.23 Material and Component Testing	EXTENSOMETER, HIGH TEMPERATURE AXIAL,M#:632.54F-14	Intertechnology Inc. (S#) Serial:388513	no	Fits within frame footprint when installed; occupies 1.5'x1.5'x0.5' space in storage.	
37	0	NRC-M13-045	3.23 Material and Component Testing	FURNACE,HIGH TEMPERATURE,M#:653.02A W/TEMP. CONTRO	INTERTECHNOLOGY INC. (S#) Serial:1080186	no	Fits within frame footprint when installed; occupies 2x2x2 space in storage.	
38	0	NRC-M13-045	3.23 Material and Component Testing	EXTENSOMETER, HIGH TEMPERATURE, MODEL # 632.54F-11	INTERTECHNOLOGY INC. (S#) Serial:1073987	no	Fits within frame footprint when installed; occupies 1.5'x1.5'x0.5' space in storage.	
39	0	NRC-M13-045	3.23 Material and Component Testing	MTS TESTAR II, MODEL # 490018	MTS (S#) Serial:1077220	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.	
40	E14	NRC-M13-121A	3.20 Microscope Lab	TESTER,HARDNESS,INSTRON/WILSON, ROCKWELL,Series 2000	WILSON (S#3006090) Serial:R20001597	YES	Installs on top of bench	1x storage cabinet. as machine operated by PC and stage moving controllers
41	0	NRC-M13-045	3.23 Material and Component Testing	TESTSTAR IIS CONTROLLER SYSTEM, 1 YR WARRANTY	MTS SYSTEMS CORP (S#1003151) Serial:	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.	
42	0	NRC-M13-045	3.23 Material and Component Testing	NOVA STAR 5kw RADIO FREQUENCY POWER SUPPLY old bc 238001	(S#1011563) Serial:	no	Equipment is usually placed into 19" x 36" deep x 22U rack or stood on edge on the floor on custom mounting legs. When in rack it occupies the rack footprint; outside of rack it occupies a 1'x3' floor area by itself within the standard test frame unit cell. Requires process cooling water minimum 1 GPM, 60 psi.	
43	0	NRC-M13-045	3.23 Material and Component Testing	AMERITHERM NovaStar 5kW INDUCTION HEATER POWER$16K old bc 238001	Ameritherm (S#1011653) Serial:	no	Equipment is usually placed into 19" x 36" deep x 22U rack or stood on edge on the floor on custom mounting legs. When in rack it occupies the rack footprint; outside of rack it occupies a 1'x3' floor area by itself within the standard test frame unit cell.	

ID	Equipment height (ft)	Equipment weight (lbs)	Foot Print WxL (ft)	Ideal Area Required WxL (ft)	Footprint Metric WxL (metric)	Ideal Area Required WxL (metric)	Ideal Room Height	Power Requirement (Req' more than 120V)	Fuel Consumed	Process Cooling Required	Back-up Power Required	Primary Power	Secondary Power	Tertiary Power	Quartenary Power	Additional Power	Process Cooling
1	10	1000	na	na			Mid-bay		No	No	No						
2	3	100	1x3					High	No	Yes	Yes	485 VAC 3Ph, 15 A UPS					
3	3	150	3x3									485 VAC 3Ph, 25 A UPS					
4	8	500	2x3	15x20	305 x 305		Mid-bay	High	No	Yes	No	600 VAC 3Ph 70A	230 VAC 40A				Building Process
5	3	135	3x5	6x8	915 x 1525	1830 x 2440	Normal	Normal	No	No	No	120 VAC 1Ph, 15 A	None	None	None	No	None
~~6~~			~~5x8~~	~~13x14~~	~~1525 x 2440~~	~~3965 x 4270~~	~~Normal~~	~~Normal~~	~~Yes~~	~~Yes~~	~~Yes~~	~~230 VAC 1Ph, >20 A~~	~~Other (Specify)~~	~~None~~	~~None~~	~~No~~	~~Chiller Self-Contained. Item 615 and 616~~
~~7~~																	
8	3	250	3x5	6x6	915 x 1525	1830 x 1830	Mid-bay					110 VAC	110 VAC, 20A				
9	3	250	1.5x2	4.5x4.5	455 x 610	1375 x 1375	Normal	Normal	No	Yes	No	120 VAC 1Ph, 15 A	None	None	None	No	None
10	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay	High	No	Yes	Yes	Hydraulic	110 VAC, UPS				Chiller with Heat Exchanger
11	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay	High	No	Yes	Yes	Hydraulic	110 VAC, UPS				Chiller with Heat Exchanger
12	0.5	1	1.5x1.5									None					
13	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay	High	No	Yes	Yes	Hydraulic	110 VAC, UPS				Chiller with Heat Exchanger
14	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay	High	No	Yes	Yes	Hydraulic	110 VAC, UPS				Chiller with Heat Exchanger
15	2	50	2x3									110 VAC, UPS					
16	12	<5000	10 x 12	15x20	3050 x 3660	4575 x 6100	Normal	High	No	No	No	600 VAC 3Ph 70A	230 VAC 40A				None
17	1	100	1.5x1.5														
18	0.5	1	1.5x1.5									None					
19	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay	High	No	Yes	Yes	Hydraulic	110 VAC, UPS				Chiller with Heat Exchanger
20	1	20	2x2		1830 x 915	4575 x 3965						110 VAC, UPS					
21	10	<5000	8x10	8x10	2440 x 3050							485 3Ph, 200 A					
22	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay	High	No	Yes	Yes	Hydraulic	110 VAC, UPS				Chiller with Heat Exchanger
23	1	20	2x2		1830 x 915	4575 x 3965							110 VAC, UPS				
24	1.5	150	2.5x2	5x5	765 x 610	1525 x 1525	Normal	Normal	No	No	No	120 VAC 1Ph, 15 A	None	None	None	No	None
25	2	100	2x2									110 VAC, 20 A UPS					
26	2	100	2x2									110 VAC, 20 A UPS					
27	7	3000	3x11	10x14	915 x 3350	3050 x 4270	Normal	Normal	No	Yes	Yes	See Answer to Frameworks Question for general technical requirements.					Stand alone chiller unit is presently used. Item 615 and 616
28			N/A	N/A													
29			N/A	N/A													
30	2	100	2x2									110 VAC, 20 A UPS					
31	1	50	2x2									110 VAC UPS					
32	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay	High	No	Yes	Yes	Hydraulic	110 VAC, UPS				Chiller with Heat Exchanger
33	2	100	2x2		1830 x 915							110 VAC, 20 A UPS					
34	2	100	2x3									110 V UPS					
35	2	50	2x2									None					
36	0.5	1	1.5x1.5									None					
37	2	100	2x2									110 VAC, 20 A UPS					
38	0.5	1	1.5x1.5									None					
39	2	50	2x3									110 VAC, UPS					
40	5	<500	3x6	8x6	915 x 1830	2440 x 1830	Normal	Normal	No	No	No	120 VAC 1Ph, 15 A	none	None	None	none	None
41	2	50	2x3									110 VAC, UPS					
42	3	100	1x3					High	No	Yes	Yes	485 VAC 3Ph, 15 A UPS					
43	3	100	1x3					High	No	Yes	Yes	485 VAC 3Ph, 15 A UPS					

ID	City Water Backup	Compressed Air	City Water Supply	Effluent Plumbing Requirements	Compressed Gases	Natural Gas used?	Flammable Compressed Gases	Special Ventilation	Operating temperatures (deg Celsius)	Sensitive to vibrations?	Noisy equipment?	Lifing Aids	Primary Work Surface	Secondary Work Surface	Equipment Rack	Storage Type	Additional Spec Sheet Available	Network Connection (Y/N)	External Dedicated Equipment (Y/N)	External Dedicated Equipment Dimensions (W x L x H inches)	External Dedicated Equipment Clearance (inches)
1																		N			
2																		N			
3																		N			
4	No	Yes	No	None	UHP Argon		None	Vacuum Exhaust				Trolley Chain Hoist Overhead Rail 500 lbs	None					N	N	N/A	N/A
5	No	No	No	None	None	No	None	None	Ambient	Yes	No	None	Other (Specify)	None		Standard Cabinet 36" Wide		Y	Y	already part of column S	already part of column T
~~6~~	~~No~~	~~No~~	~~No~~	~~None~~	~~None~~		~~None~~	~~None~~				~~None~~	~~Other (Specify)~~	~~Standard 36" Bench~~		~~Standard Cabinet 36" Wide~~	~~Yes~~				
~~7~~																					
8																		N	N	N/A	N/A
9	No	Yes	Yes	Solids Sediment Trap	None	No	None	None	No			None	Standard 60" Bench	None		Storage 60" Bench		N	N	N/A	N/A
10																	Yes	Y	Y	already part of column S	already part of column T
11																	Yes	Y	Y	already part of column S	already part of column T
12																		Y			
13																	Yes	Y	Y	already part of column S	already part of column T
14																		Y	Y	already part of column S	already part of column T
15																		N			
16	No	No	No	None	None		None	None				None	HT Bench 72"					Y	Y	already part of column S	already part of column T
17																	Yes				
18																					
19																	Yes	Y	Y	already part of column S	already part of column T
20																					
21																		N	N	N/A	N/A
22																	Yes	Y	Y	already part of column S	already part of column T
23																					
24	No	No	No	None	None	No	None	None	Ambient			None	Standard 60" Bench	None				N	N	N/A	N/A
25																					
26																					
27	No	Yes	No	Standard	Nitrogen		None	Vacuum Exhaust	Max ambient temp range within specs 10°C/30°C; temp stability<1°C/hr; Revative humidity at 20°C, <95% without condensation	Yes		None	Other (Specify)	Standard 72" Bench		Standard Cabinet 36" Wide	Yes	Y	Y	already part of column S	already part of column T
28																		N	N	N/A	N/A
29																		N	N	N/A	N/A
30																					
31																					
32																	Yes	Y	Y	already part of column S	already part of column T
33																					
34																					
35																					
36																					
37																					
38																					
39																					
40	No	No	No	None	None	none	None	None	none		none	None	Standard 72" Bench	None	none	Standard Cabinet 36" Wide	N/A	N	N	N/A	N/A
41																					
42																					
43																					

ID	REVIT Type ID	OLD Space Code (Building & Rm No.)	NEW Space Code	Name	Manufacturer (Make & Model)	Considered for Functional Program	Notes	Notes Other
44	0	NRC-M13-045	3.23 Material and Component Testing	CRACK GROWTH MONITORING SYSTEM,CGM-7 (240KHz/5AMPS	MATELECT LTD (S#1053520) Serial:90392	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount in standard test frame unit cell. In	
45	0	NRC-M13-056	4.9 HTM Testing Equipment Storage	652.02 FURNACE FOR CONTROLLER ASSET #237059	(S#1000491) Serial:01-1498	no	Fits within frame footprint when installed; occupies 2x2x2 space in storage.	
46	0	NRC-M13-045	3.23 Material and Component Testing	652.02 CONTROLLER FOR FURNACE ASSET #237060	(S#1000491) Serial:135670	no	Fits within frame footprint when installed; occupies 2x2x2 space in storage.	
47	0	NRC-M13-045	3.23 Material and Component Testing	ADWIN GOLD DATA,DC POTENTIAL DROP,TM506A($19,850)	(S#1055140) Serial:T0010200	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount in standard test frame unit cell. In storage occupies 2x3x1.	
48	0	NRC-M13-045	3.23 Material and Component Testing	ADWIN GOLD DATA,DC POTENTIAL DROP,TM506A($19,850)	(S#1055140) Serial:T0080296	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount in standard test frame unit cell. In storage occupies 2x3x1.	
49	E15	NRC-M13-050A	4.2 Pump Room	HYDRAULIC POWER UNIT (MODEL 505.30) ($48,718.16)	MTS SYSTEMS CORP (S#1011653) Serial:1376078	YES		Oil Storage
50	E16	NRC-M13-045	3.23 Material and Component Testing	100 KN HYDRAULIC TEST SYSTEM ($56,354)	MTS SYSTEMS CORP (S#1011653) Serial:1375782	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack
51	E16	NRC-M13-045	3.23 Material and Component Testing	100 KN HYDRAULIC TEST SYSTEM ($56,354)	MTS SYSTEMS CORP (S#1011653) Serial:1375783	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack
52	0	NRC-M13-045	3.23 Material and Component Testing	TESTSTAR IIS CONTROLLER ($59,952)	MTS SYSTEMS CORP (S#1011653) Serial:1355193	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.	
53	0	NRC-M13-045	3.23 Material and Component Testing	TESTSTAR IIS CONTROLLER ($59,952)	MTS SYSTEMS CORP (S#1011653) Serial:1354390	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.	
54	0	NRC-M13-056	4.9 HTM Testing Equipment Storage	FURNACE MODEL 652.02 ($38,047) temp at U66Aug 2016	MTS SYSTEMS CORP (S#1011653) Serial:1376047	no	Fits within frame footprint when installed; occupies 2x2x2 space in storage.	
55	0	NRC-M13-045	3.23 Material and Component Testing	FURNACE MODEL 652.02 ($38,047)	MTS SYSTEMS CORP (S#1011653) Serial:1376048	no	Fits within frame footprint when installed; occupies 2x2x2 space in storage.	
56	0	NRC-M13-045	3.23 Material and Component Testing	HI-TEMPERATURE LCF GRIP SET(MODEL 680-01B)($38725)	MTS SYSTEMS CORP (S#1011653) Serial:1373776	no	Fits within frame footprint when installed; occupies 1x2x2 space in storage.	
57	0	NRC-M13-045	3.23 Material and Component Testing	HI-TEMPERATURE LCF GRIP SET(MODEL 680-01B)($38725)	MTS SYSTEMS CORP (S#1011653) Serial:1375386	no	Fits within frame footprint when installed; occupies 1x2x2 space in storage.	
58	0	NRC-M13-045	3.23 Material and Component Testing	COD EXTENSOMETER (MODEL 632.65E-03) ($20,919)	MTS SYSTEM CORP (S#1011653) Serial:1373900	no	Fits within frame footprint when installed; occupies 1.5'x1.5'x0.5' space in storage.	
59	0	NRC-M13-045	3.23 Material and Component Testing	COD EXTENSOMETER (MODEL 632.65E-03) ($20,919)	MTS SYSTEMS CORP (S#1011653) Serial:1373901	no	Fits within frame footprint when installed; occupies 1.5'x1.5'x0.5' space in storage.	
60	0	NRC-M13-056	4.9 HTM Testing Equipment Storage	CGM-7 CRACK GROWTH MONITOR,MATELECT,TRADE-IN#82713	MATELECT (S#1053520) Serial:90409	no	When in use, fits in frame footprint. Typically rack mounted.	
61	0	NRC-M13-056	4.9 HTM Testing Equipment Storage	CGM-7 CRACK GROWTH MONITOR,MATELECT,TRADE-IN#82713 old bc 238015	MATELECT (S#1053520) Serial:	no	When in use, fits in frame footprint. Typically rack mounted.	
62	E17	NRC-M13-121	3.9 HTM R&D Lab	S60/111102,SETSYS 16/18 MAIN HOUSING	(S#1056269) Serial:S60/56214 2706-1	no	Uses vacuum pump, requires installation on bench.	This is spare equipment and will be put into storage.
63	0	NRC-M13-045	3.23 Material and Component Testing	MTS TestStar IIs controllers ($60K CDN)	MTS (S#1000491) Serial:1408373	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.	
64	0	NRC-M13-045	3.23 Material and Component Testing	MTS TestStar IIs controllers ($60K CDN)	MTS (S#1000491) Serial:1408375	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.	
65	0	NRC-M13-045	3.23 Material and Component Testing	MTS TestStar IIs controllers ($60K CDN)	MTS (S#1000491) Serial:1408376	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.	
66	0	NRC-M13-056	4.9 HTM Testing Equipment Storage	MTS TestStar IIs controllers ($60K CDN)	MTS (S#1000491) Serial:1372596	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.	
67	0	NRC-M13-045	3.23 Material and Component Testing	MTS Remote station control panels ($14,846)	MTS (S#) Serial:1454139	no	Fits within frame footprint.	
68	0	NRC-M13-045	3.23 Material and Component Testing	MTS Remote station control panels ($14,846)	MTS (S#) Serial:1372004	no	Fits within frame footprint.	
69	0	NRC-M13-045	3.23 Material and Component Testing	MTS Remote station control panels ($14,846)	MTS (S#) Serial:1372002	no	Fits within frame footprint.	
70	0	NRC-M13-045	3.23 Material and Component Testing	MTS Remote station control panels ($14,846)	MTS (S#) Serial:1372003	no	Fits within frame footprint.	
71	E160	NRC-M13-045	3.23 Material and Component Testing	MTS 100 kN hydraulic load frames ($44,000 CDN	MTS (S#) Serial:1448151	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack
72	E160	NRC-M13-045	3.23 Material and Component Testing	MTS 100 kN hydraulic load frames ($44,000 CDN	MTS (S#) Serial:1448123	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack
73	E160	NRC-M13-045	3.23 Material and Component Testing	MTS 100 kN hydraulic load frames ($44,000 CDN	MTS (S#) Serial:1448124	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack
74	E160	NRC-M13-045	3.23 Material and Component Testing	MTS 100 kN hydraulic load frames ($44,000 CDN	MTS (S#) Serial:1448150	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack
75	0	NRC-M13-045	3.23 Material and Component Testing	MTS HIGH TEMPERATE GRIPS ($14,100 US)	MTS (S#1000491) Serial:	no	Fits within frame footprint when installed; occupies 1x2x2 space in storage.	
76	0	NRC-M13-045	3.23 Material and Component Testing	MTS HIGH TEMPERATE GRIPS ($14,100 US)	MTS (S#1000491) Serial:	no	Fits within frame footprint when installed; occupies 1x2x2 space in storage.	
77	0	NRC-M13-045	3.23 Material and Component Testing	MTS HIGH TEMPERATE GRIPS ($14,100 US)	MTS (S#1000491) Serial:	no	Fits within frame footprint when installed; occupies 1x2x2 space in storage.	
78	0	NRC-M13-045	3.23 Material and Component Testing	MTS HIGH TEMPERATE GRIPS ($14,100 US)	MTS (S#1000491) Serial:	no	Fits within frame footprint when installed; occupies 1x2x2 space in storage.	
79	0	NRC-M13-045	3.23 Material and Component Testing	FTA ADWIN GOLD CONTROLLER ($6,425 US)	FRACTURE TECHNOLOGY ASSOCIATES (S#1055140) Serial:8442	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount in standard test frame unit cell. In storage occupies 2x3x1.	
80	0	NRC-M13-045	3.23 Material and Component Testing	FTA ADWIN GOLD CONTROLLER,TM5006A ($6,425 US)	FRACTURE TECHNOLOGY ASSOCIATES (S#1055140) Serial:B011054	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount in standard test frame unit cell. In storage occupies 2x3x1.	
81	0	NRC-M13-045	3.23 Material and Component Testing	FTA DCPD CURRENT MODULE & CHANNEL AMPLIFIER($9500)	FTA (S#1055140) Serial:B010183	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount in standard test frame unit cell. In storage occupies 2x3x1.	
82	0	NRC-M13-045	3.23 Material and Component Testing	FTA ADWIN GOLD CONTROLLER ($9500)	FRACTURE TECHNOLOGY ASSOCIATES (S#1055140) Serial:	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount in standard test frame unit cell. In storage occupies 2x3x1.	
83	0	NRC-M13-045	3.23 Material and Component Testing	AMERITHERM NovaStar 5kW INDUCTION HEATER POWER$16K	Ameritherm (S#1011653) Serial:342528	no	Equipment is usually placed into 19" x 36" deep x 22U rack or stood on edge on the floor on custom mounting legs. When in rack it occupies the rack footprint; outside of rack it occupies a 1'x3' floor area by itself within the standard test frame unit cell.	
84	0	NRC-M13-045	3.23 Material and Component Testing	EXTENSOMETER HIGH TEMP MODEL 3555-0050,.5"GAGE	EPSILON TECHNOLOGY CORP (S#1059966) Serial:E82120	no	Fits within frame footprint when installed. Occupies 0.5x2x2 in storage	
85	E18	NRC-M13-121	3.9 HTM R&D Lab	TGA(Thermo Gravimetric Analyzer) w/ mechanical pum and Notebook computer - transfer to AERO	Setsys Evolution SETARAM INC. (S#1056269) Serial:S60/56214 5287-1	YES	Uses vacuum pump. Requires compressed air and cooling water supply	Uses vacuum pump
86	0	NRC-M13-045	3.23 Material and Component Testing	TESTAR Iis Frame 14	(S#1000491) Serial:	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.	
87	E19	NRC-M13-121A	3.20 Microscope Lab	MICROHARDNESS TESTER PACKAGE,AUTOMATED/m#:863-472	LECO (S#3006089) Serial:3017	YES	Requires installation on vibration suppressing table.	1x storage cabinet. Standard 72"bench as machine operated by PC and stage moving controllers
88	E20	NRC-M13-121A	3.20 Microscope Lab	MEASURING MICROSCOPE XY DIGITAL,MODEL:W126	GAERTNER SCIENTIFIC CORP. (S#3029208) Serial:153-AG	YES	Requires installation on vibration suppressing table.	Standard 36" bench as machine operated by PC and stage moving controllers
89	E140	NRC-M13-121C	3.12 HTM Prep Room	T/C CALIBRATOR DUAL TEMPERATURE RANGE,FLUKE 518	FLUKE ELECTRONICS (S#1004000) Serial:788208	YES	Typically used on work surface, standard work bench.	This room will also contain 3 tool chests on wheels, quantity 4 2.5x4x6 storage cabinets, quantity 2 work benches with task lighting used for soldering work stations, quantity 3 mobile drawer units for fastener and small parts storage, drill press and bench grinder on work surface with 10" vise, various small corded and cordless power tools.
90	0	NRC-M13-056	4.9 HTM Testing Equipment Storage	BOX FURNACE SPECIAL SERIES 3160	APPLIED TEST SYSTEM INC (S#1009026) Serial:04-0656	no	When in use fits within frame foot print. Occupies 2x3x2 in storage.	

ID	Equipment height (ft)	Equipment weight (lbs)	Foot Print WxL (ft)	Ideal Area Required WxL (ft)	Footprint Metric WxL (metric)	Ideal Area Required WxL (metric)	Ideal Room Height	Power Requirement (Req' more than 120V)	Fuel Consumed	Process Cooling Required	Back-up Power Required	Primary Power	Secondary Power	Tertiary Power	Quaternary Power	Additional Power	Process Cooling
44	1	40	2x2									110 VAC, UPS					
45	2	100	2x2									110 VAC, 20 A UPS					
46	2	100	2x2									110 VAC, UPS					
47	1	40	2x3									110 VAC, UPS					
48	1	40	2x3									110 VAC, UPS					
49	6	1000	3x6	8x10	915 x 1830	2440 x 3050	Normal	High	No	Yes	Yes	600 VAC 3Ph, 100A UPS					cooling tower water
50	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay	High	No	Yes	Yes	Hydraulic	110 VAC, UPS				Chiller with Heat Exchanger
51	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay	High	No	Yes	Yes	Hydraulic	110 VAC, UPS				Chiller with Heat Exchanger
52	1	50	2x3									110 VAC, UPS					
53	1	50	2x3									110 VAC, UPS					
54	2	100	2x2									110 VAC, 20 A UPS					
55	2	100	2x2									110 VAC, 20 A UPS					
56	1	50	1x1														
57	1	50	1x1														
58	0.5	1	1.5x1.5														
59	0.5	1	1.5x1.5														
60	0.5	20	1.5x1.5									110 VAC, UPS					
61	0.5	20	1.5x1.5									110 VAC, UPS					
62	3	200	3x3	6x8	915 x 915	1830 x 2440	Normal	Normal	No	No	No	230 VAC 1Ph, 20 A	120 VAC 1Ph, 15 A				
63	1	50	2x3									110 VAC, UPS					
64	1	50	2x3									110 VAC, UPS					
65	1	50	2x3									110 VAC, UPS					
66	1	50	2x3									110 VAC, UPS					
67	N/A	N/A															
68	N/A	N/A															
69	N/A	N/A															
70	N/A	N/A															
71	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay	High	No	Yes	Yes	Hydraulic	110 VAC, UPS				Chiller with Heat Exchanger
72	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay	High	No	Yes	Yes	Hydraulic	110 VAC, UPS				Chiller with Heat Exchanger
73	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay	High	No	Yes	Yes	Hydraulic	110 VAC, UPS				Chiller with Heat Exchanger
74	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay	High	No	Yes	Yes	Hydraulic	110 VAC				Chiller with Heat Exchanger
75	1	50	1x1														
76	1	50	1x1														
77	1	50	1x1														
78	1	50	1x1														
79	1	40	2x3									110 VAC, UPS					
80	1	40	2x3									110 VAC, UPS					
81	1	40	2x3									110 VAC, UPS					
82	1	40	2x3									110 VAC, UPS					
83	3	100	1x3					High	No	Yes	Yes	485 VAC 3Ph, 15 A UPS					
84	0.5	2	2x2														
85	3	250	3x6	6x8	915 x 1830	1830 x 2440	Normal	Normal	No	No	No	230 VAC 1Ph, 20 A	120 VAC 1Ph, 15 A				
86	1	50	2x3														
87	2	200	3x3	8x10	915 x 1830	2440 x 3050	Normal	Normal	No	No	No	120 VAC 1Ph, 15 A	none	None	None	none	None
88	2	50	2x2	2x2	610 x 610	-	Normal	Normal	No	No	No	120 VAC 1Ph, 15 A	none	None	None	none	None
89	2	50	2x2	2x2	610 x 610							120 VAC 1Ph, 15 A					
90	2	100	2x2									110 VAC, 20 A UPS					

ID	City Water Backup	Compressed Air	City Water Supply	Effluent Plumbing Requirements	Compressed Gases	Natural Gas used?	Flammable Compressed Gases	Special Ventilation	Operating temperatures (deg Celsius)	Sensitive to vibrations?	Noisy equipment?	Lifing Aids	Primary Work Surface	Secondary Work Surface	Equipment Rack	Storage Type	Additional Spec Sheet Available	Network Connection (Y/N)	External Dedicated Equipment (Y/N)	External Dedicated Equipment Dimensions (W x L x H inches)	External Dedicated Equipment Clearance (inches)
44																					
45																					
46																					
47																					
48																					
49		Yes	Yes													Other (Specify)		Y	N	already part of column S	already part of column T
50																		Y	Y	already part of column S	already part of column T
51																		Y	Y	already part of column S	already part of column T
52																					
53																					
54																					
55																					
56																					
57																					
58																					
59																					
60																					
61																					
62		Yes			Air								Standard 72" Bench								
63																					
64																					
65																					
66																					
67																					
68																					
69																					
70																					
71																		Y	Y	already part of column S	already part of column T
72																		Y	Y	already part of column S	already part of column T
73																		Y	Y	already part of column S	already part of column T
74																		Y	Y	already part of column S	already part of column T
75																					
76																					
77																					
78																					
79																					
80																					
81																					
82																					
83																					
84																					
85		Yes			Air								Standard 72" Bench					Y	Y	already part of column S	already part of column T
86																					
87	No	No	No	None	None	none	None	None	ambient	Yes	none	None	Standard 72" Bench	None	none	Storage 72" Bench	N/A	Y	Y	already part of column S	already part of column T
88	No	No	No	None	None	none	None	None	ambient	Yes	no	None	Standard 36" Bench	None	none	None	N/A	Y	Y	already part of column S	already part of column T
89																		Y	Y	already part of column S	already part of column T
90																					

ID	REVIT Type ID	OLD Space Code (Building & Rm No.)	NEW Space Code	Name	Manufacturer (Make & Model)	Considered for Functional Program	Notes	Notes Other	Equipment height (ft)	Equipment weight (lbs)	Foot Print WxL (ft)	Ideal Area Required WxL (ft)	Footprint Metric WxL (metric)	Ideal Area Required WxL (metric)	Ideal Room Height	Power Requirement (Req' more than 120V)	Fuel Consumed	Process Cooling Required	Back-up Power Required	Primary Power	Secondary Power	Tertiary Power	Quaternary Power	Additional Power	Process Cooling	City Water Backup	Compressed Air	City Water Supply	Effluent Plumbing Requirements	Compressed Gases	Natural Gas used?	Flammable Compressed Gases	Special Ventilation	Operating temperatures (deg Celsius)	Sensitive to vibrations?	Noisy equipment?	Lifing Aids	Primary Work Surface	Secondary Work Surface	Equipment Rack	Storage Type	Additional Spec Sheet Available	Network Connection (Y/N)	External Dedicated Equipment (Y/N)	External Dedicated Equipment Dimensions (W x L x H inches)	External Dedicated Equipment Clearance (inches)
91	0	NRC-M13-045	3.23 Material and Component Testing	HIGH TEMP° LCF GRIP SET TEMP° AT 1800°C,680.01B-02	MTS SYSTEMS CORPORATION (S#1009137) Serial:10165525B	no	Fits within frame footprint when installed; occupies 1x2x2 space in storage.		1	50	1x1																																			
92	0	NRC-M13-045	3.23 Material and Component Testing	HIGH TEMP AXAIL EXTENSIOMETER	(S#1009137) Serial:	no	Fits within frame footprint when installed; occupies 1.5'x1.5'x0.5' space in storage.		0.5	1	1.5x1.5																																			
93	E21	NRC-M13-121	3.9 HTM R&D Lab	Hydrogen Volumetric Sorption Analyzer HyPCT2000 Analyzer - transfer to AERO	HY-ENERGY, LLC (S#1071006) Serial:14	YES	Uses vacuum pump	Uses vacuum pump	4	200	6x8	6x10	1830 x 2440	1830 x 3050	Normal	Normal	No	No	No	120 VAC 1Ph, 15 A																		Standard 72" Bench					Y	Y	already part of column S	already part of column T
94	0	NRC-M13-121	3.9 HTM R&D Lab	PRESSURE COMPOSITION TEMPERATURE MEASUREMENT SYS also bc 3009306	HY-ENERGY, LLC (S#1071006) Serial:	YES	Subsystem to ID 93 accounted for in foot print	This is a sub asset to #93 and fit within the specified footprint.t			N/A	N/A								120 VAC 1Ph, 15 A																		Standard 72" Bench					N	N	N/A	N/A
95	0	NRC-M13-121	3.9 HTM R&D Lab	PCRPRO2000 AERO Dongyi Seo	HY-ENERGY, LLC (S#1071006) Serial:	YES	Subsystem to ID 93 accounted for in foot print	This is a sub asset to #93 and fit within the specified footprint.t			N/A	N/A								120 VAC 1Ph, 15 A																		Standard 72" Bench					N	N	N/A	N/A
96	0	NRC-M13-045	3.23 Material and Component Testing	AXIAL EXTENSOMETER MTS,MODEL:632,54F-14	(S#1009137) Serial:388519	no	Fits within frame footprint when installed; occupies 1.5'x1.5'x0.5' space in storage.		0.5	1	1.5x1.5																																			
97	0	NRC-M13-045	3.23 Material and Component Testing	MTS 709 ALIGNMENT SYSTEM,DATA AQUISITION	MTS SYSTEMS CORPORATION (S#1009137) Serial:10D813E	no	When in use, fits in frame footprint.		1	5	2x3																																			
98	0	NRC-M13-045	3.23 Material and Component Testing	AXIAL EXTENSOMETER MTS,MODEL:632,54F-14	(S#1009137) Serial:388517	no	Fits within frame footprint when installed; occupies 1.5'x1.5'x0.5' space in storage.		0.5	1	1.5x1.5																																			
99	0	NRC-M13-045	3.23 Material and Component Testing	AXIAL EXTENSOMETER MTS,MODEL:632,54F-14	MTS SYSTEMS (S#1009137) Serial:388518	no	Fits within frame footprint when installed; occupies 1.5'x1.5'x0.5' space in storage.		0.5	1	1.5x1.5																																			
100	0	NRC-M13-045	3.23 Material and Component Testing	AXIAL EXTENSOMETER MTS,MODEL:632,54F-14	MTS SYSTEMS (S#1009137) Serial:388516	no	Fits within frame footprint when installed; occupies 1.5'x1.5'x0.5' space in storage.		0.5	1	1.5x1.5																																			
101	0	NRC-M13-56	4.9 HTM Testing Equipment Storage	SPLIT TUBE FURNACE	(S#1000491) Serial:C150372	no	Fits within frame footprint when installed; occupies 2x2x2 space in storage.		2	100	2x2									120 VAC, 20A UPS																										
102	0	NRC-M13-045	3.23 Material and Component Testing	SPLIT TUBE FURNACE	(S#1000491) Serial:C150373	no	Fits within frame footprint when installed; occupies 2x2x2 space in storage.		2	100	2x2									120 VAC, 20A UPS																										
103	0	NRC-M13-045	3.23 Material and Component Testing	SPLIT TUBE FURNACE	(S#1000491) Serial:C150374	no	Fits within frame footprint when installed; occupies 2x2x2 space in storage.		2	100	2x2									120 VAC, 20A UPS																										
104	0	NRC-M13-045	3.23 Material and Component Testing	SPLIT TUBE FURNACE	(S#1000491) Serial:C150375	no	Fits within frame footprint when installed; occupies 2x2x2 space in storage.		2	100	2x2									120 VAC, 20A UPS																										
105	0	NRC-M13-045	3.23 Material and Component Testing	MTS CONTROLLER,Flex Test SE System Model 493.02	(S#1000491) Serial:	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.		1	50	2x3									120 VAC, 15A UPS																										
106	E22	NRC-M13-121D	3.17 Heat Treatment and Coating Lab	Vertical Tube FURNACE, LINDBERG HTF55667C-SPL and Controller 58124-P4-COM Transfer to AERO	THERMAL PRODUCT SOLUTIONS (S#1074006) Serial:32686 / A010166	YES	Requires heat/fumes extraction hood.	240V 30A	6	<500	3x6	3x6	915 x 1830	1830 x 3050	Normal	High	No	No	No	110 VAC, 20 A	110 VAC																					Yes	N	N	N/A	N/A
107	0	NRC-M13-045	3.23 Material and Component Testing	AUTOMATED FATIGUE CRACK GROWTH PACKAGE	(S#1055140) Serial:B71G09;USB#4291	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount in standard test frame unit cell. In storage occupies 2x3x1.		1	40	2x3									110 VAC, UPS																										
108	0	NRC-M13-045	3.23 Material and Component Testing	DC POTENTIAL DROP SYSTEM,TM506A,CURRENT AMPLIFIER	(S#1055140) Serial:T00131205	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount in standard test frame unit cell. In storage occupies 2x3x1.		1	40	2x3									110 VAC, UPS																										
109	0	NRC-M13-045	3.23 Material and Component Testing	UPS EMERSON NETWORK POWER,Liebert N Power(post$68K	POST CAP FOR LAFLEUR,L (S#) Serial:37-2916	no	UPS 600V 3ph 130kVA requires backup power source (generator)		6	4000	4x12				Mid-bay	High	No	No	Yes	600 VAC, 3Ph, 125 A																						Yes				
110	0	NRC-M13-045	3.23 Material and Component Testing	FLEXTEST GT CONTROLLER SYSTEM MODEL 493.10	MTS SYSTEMS (S#1000491) Serial:1461328	no	Fits in footprint of standard test frame unit cell.		3	100	2x3									110 VAC, UPS																										
111	0	NRC-M13-045	3.23 Material and Component Testing	BATTERY MONITORING SYSTEM GXT2-1000RT120(BDS-40)	LIEBERT CANADA (S#1007843) Serial:6348R0028AF031	no	Fits inside footprint of UPS.		2	50	2x3									110 VAC																										
112	0	NRC-M13-045	3.23 Material and Component Testing	UNIVERSAL APPLICATIONS FURNACE(PAID 31k)	(KEARSEY)OXYGON INDUSTRIES INC (S#1070389) Serial:F00116	no	Fits inside footprint of test frame unit cell when in use. Comprises furnace, control system and UHP argon gas cylinder. Requires 3x6x5 for storage.		5	300	3x3									230 VAC, 30A	110 VAC, 15A																									
113	0	NRC-M13-045	3.23 Material and Component Testing	POWER SUPPLY,EASY HEAT 5060 INDUCTION	(DUDZINSKI)AMERITHERM INC. (S#1011653) Serial:111036-09070741	no	Equipment is usually placed into 19" x 36" deep x 22U rack or stood on edge on the floor on custom mounting legs. When in rack it occupies the rack footprint; outside of rack it occupies a 1'x3' floor area by itself within the standard test frame unit cell. Requires process cooling water minimum 1 GPM, 60 psi.		3	100	1x3									485 VAC 3Ph, 15 A UPS																										
114	0	NRC-M13-045	3.23 Material and Component Testing	EASYHEAT 5060 INDUCTION POWER SUPPLY	(BULMERS)AMERITHERM INC. (S#1011653) Serial:111253-09090741	no	Equipment is usually placed into 19" x 36" deep x 22U rack or stood on edge on the floor on custom mounting legs. When in rack it occupies the rack footprint; outside of rack it occupies a 1'x3' floor area by itself within the standard test frame unit cell. Requires process cooling water minimum 1 GPM, 60 psi.		3	100	1x3					High	No	Yes	Yes	485 VAC 3Ph, 15 A UPS																										
115	E23	NRC-M13-146	3.21 Metallographic Sectioning and Specimen Extraction	Precision Cut-Off Secotom-10 LUPANDINAO	STRUERS A/S. (S#3014074) Serial:50310092	YES		4x Standard Storage cabinets for consumables	1.5	150	2x2.5	5x5	610 x 765	1525 x 1525	Normal	Normal	No	No	No	240 VAC, 2ph, 15A	none	none	none	none	none	No	No	No	none	None	none	None	none	ambient	no	no	None	Standard 60" Bench	None	no	Standard Cabinet 36" Wide		N	N	N/A	N/A
116	0	NRC-M13-045	3.23 Material and Component Testing	ULTRASONIC GENERATOR and sonotrode hardware forUHF	(Rick Kearsey) (S#1008261) Serial:N/A	no	Equipment is usually placed into 19" x 36" deep x 22U rack. When in rack it occupies the rack footprint; in a standard test machine unit cell. Equipment also requires compressed air.		1	50	2x3									230 VAC, 20A, UPS																										
117	0	NRC-M13-045	3.23 Material and Component Testing	NI PXI-6221,DIGITIZER,HIGH SPEED,National Instrume 46SM-J035,PQ#637215,same day operational as receiv	(Scott Yandt)National Instrume (S#1092584) Serial:16739C8	no	Fits inside footprint of test frame unit cell when in use. Occupies 1x1x1 when in storage.		1	30	1x1									110 VAC, UPS																										
118	0	NRC-M13-045	3.23 Material and Component Testing	EasyHeat 5060, induction heater for $17K 46SM-J059, David Dudzinski,in-service next day aft	David Dudzinski)AMERITHERM INC (S#1011653) Serial:115820-12010741	YES	Equipment is usually placed into 19" x 36" deep x 22U rack or stood on edge on the floor on custom mounting legs. When in rack it occupies the rack footprint; outside of rack it occupies a 1'x3' floor area by itself within the standard test frame unit cell. Requires process cooling water minimum 1 GPM, 60 psi.		3	100	1x3	1x3				High	No	Yes	Yes	485 VAC 3Ph, 15 A UPS																							N	N	N/A	N/A
119	0	NRC-M13-045	3.23 Material and Component Testing	EASYHEAT 5060LI, 140-400KHZ, 440 VAC David Dudzinski,Luc Lafleau tag this one.	David Dudzinski) (S#1011653) Serial:116145-12030741	YES	Equipment is usually placed into 19" x 36" deep x 22U rack or stood on edge on the floor on custom mounting legs. When in rack it occupies the rack footprint; outside of rack it occupies a 1'x3' floor area by itself within the standard test frame unit cell. Requires process cooling water minimum 1 GPM, 60 psi.		3	100	1x3	1x3				High	No	Yes	Yes	485 VAC 3Ph, 15 A UPS																							N	N	N/A	N/A
120	E24	NRC-M13-044B	3.17 Heat Treatment and Coating Lab	OXIDATION FURNACE RAPID TEMP MODEL 1610 BL David Chow start-to-use date>4-Apr-2011<Gerry advi	(SEOD)CM FURNACES INC. (S#1014888) Serial:100995	YES		off gassing material 250V 60A	5	500	4x4	10 x 6	1220 x 1220	3050 x 1830	Normal	High	No		No	220 VAC, 60A					None	No	No	No	None	None		None	Extraction Hood Heat/Fumes					Standard 72" Bench				Yes	N	N	N/A	N/A
121	0	NRC-M13-045	3.23 Material and Component Testing	Model IPE 140 Infrared Pyrometer has another BC 3016996	(Peter Au)(Dongyi Seo) (S#) Serial:3222	no	Fits in footprint of standard test frame unit cell when installed. Occupies 1x1x1 when in storage.		N/A	2																																				
122	0	NRC-M13-045	3.23 Material and Component Testing	CMC High Temperature 3 point bend testing equipmen Luc Lafleur - $59K>Rick Kearsey<	APPLIED TEST SYSTEMS (S#1101131) Serial:13-10686-1	no	Fits inside footprint of test frame unit cell when in use. Comprises furnace and control system in standard rack mount. Requires 5x3x5 for storage.		5	200	3x3									220 VAC, 30A																										
123	E25	NRC-M13-146B	3.22 Metallographic Sample Preparation	GIGA-1200 Vibratory Polisher $13K Olga Lupandina >in-service>31-Oct-$189impactGIG-10	PACE TECHNOLOGIES,USA (S#3017897) Serial:GIG-1012-005	YES		4x Standard Storage cabinets for consumables.	1.5	160	1.5x2	3.5x5	455 x 610	1065 x 1525	Normal	Normal	No	No	No	110 VAC	None	None	None	No	None	No	No	No	None	None	none	None	None	ambient	no	no	None	Standard 60" Bench	None	none	Standard Cabinet 36" Wide	N/A	N	N	N/A	N/A
124	0	NRC-M13-045	3.23 Material and Component Testing	Digital Controller,MTS FT40,hydraulic MTS test>AUC Luc Lafleur>$52K>same day inservice>24-Feb-14<AUC	Luc Lafleur-Peter Au (S#1077552) Serial:494.04/09018612_E	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.		1	50	2x3									110 VAC, UPS																										
125	0	NRC-M13-045	3.23 Material and Component Testing	Digital controller, MTS FT40,servo hydraulic$52K Peter Au>in-service>1-May-2013<37653	Prakash Patnaik<37653 (S#1077552) Serial:	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.		1	50	2x3									110 VAC, UPS																										
126	E26	NRC-M13-045	3.23 Material and Component Testing	MTS Landmark Frame #1 $113k Capitalization date 2010/06/30 10 year amortizat	MTS TESTING SYSTEMS (S#1003151) Serial:10311379	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay	High	No	Yes	Yes	Hydraulic	110 VAC, UPS																						Y	Y	already part of column S	already part of column T
127	E27	NRC-M13-146	3.21 Metallographic Sectioning and Specimen Extraction	Bench-top Abrasive Cutter Rick Kearsey>AbrasiMatic300 W/XAXIS	BUEHLER INC, AbrasiMatic 300 (S#3017897) Serial:DABX-100035	YES	Unit is supplied with bench top cabinet	Power type: 240 VAC 3Ph, 20A	5	500	4x3	9x5	1220 x 915	2745 x 1525	Normal	Normal	No	No	No	240 VAC 3Ph, 20A	None	None	None	No	None	No	No	No	None	None	none	None	None	ambient	no	no	None	Other (Specify)	None	none	Standard Cabinet 36" Wide	Yes	N	N	N/A	N/A
128	0	NRC-M13-045	3.23 Material and Component Testing	Zwick/ Roell High Temperature Laser Extensometer Rick Kearsey>$80K>PO31184141744	ZWICK USA (S#1100100) Serial:	no	Fits inside footpring of test frame inside standard test frame unit cell. Occupies 3x3x3 when in storage. Uses PC with equipment.		3	100	3x3									110 VAC, UPS	110 VAC, UPS																									
129	E28	NRC-M13-148	3.20 Microscope Lab	OLYMPUS GX71 Inverted Metalurgical Microscope Rick Kearsey>Olga Lupandina old 3029829	OLYMPUS JAPAN, (S#3029829) Serial:4G44377	YES	Requires vibration suppression table	Passive Vibration Isolation Table, mod: SDP, Thorlabs, Inc	2	250	3x5	6x8	915 x 1525	1830 x 2440	Normal	Normal	No	No	No	120 VAC 1Ph, 15 A	None	None	None	No	None	No	none	No	None	None	none	None	None	ambient	Yes	no	None	Other (Specify)	None	none	Other (Specify)	N/A	Y	Y	already part of column S	already part of column T
130	0	NRC-M13-050A	4.2 Pump Room	Heat Exchanger for MTS hydraulic pumps Rick Kearsey>A1-006275	MTS TESTING SYSTEMS (S#) Serial:	no	Required to augment HPU oil heat exchanger due to inadequate process water flow.		2	150	1.5x6														cooling tower water																					
131	0	NRC-M13-045	3.23 Material and Component Testing	Hydraulic pump for testing facility at M13 Luc Lafleur $44K	MTS SYSTEMS CORPORATION (S#1077552) Serial:	no	Belongs in Pump Room		6	1000	4x6									600 VAC 3Ph, 100A					cooling tower water																					
132	0	NRC-M13-045	3.23 Material and Component Testing	AMBRELL Induction heater for testing facility M13 Luc Lafleur	AMERITHERM INC. (S#1011653) Serial:123281-116030660	no	Equipment is usually placed into 19" x 36" deep x 22U rack or stood on edge on the floor on custom mounting legs. When in rack it occupies the rack footprint; outside of rack it occupies a 1'x3' floor area by itself within the standard test frame unit cell. Requires process cooling water minimum 1 GPM, 60 psi.		3	100	1x3									485 VAC, 3Ph, 25A UPS																										
133	0	NRC-M13-045	3.23 Material and Component Testing	MTS high temperature extensometer Luc Lafleur 11K	MTS SYSTEMS CORPORATION (S#1077552) Serial:10489282	no	Fits within frame footprint when installed; occupies 1.5'x1.5'x0.5' space in storage.		0.5	1	1.5x1.5																																			
134	0	NRC-M13-045	3.23 Material and Component Testing	Digital Controller MTS FT40 servo hydr. test frame Luc Lafleur - Model 494.04 62K	MTS SYSTEMS CORPORATION (S#1077552) Serial:09089032-E	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.		1	50	2x3																																			
135	E29	NRC-M13-121	3.9 HTM R&D Lab	Micro-mechanical test frame Taylor Robertson - 78K	Rick Kearsey/Taylor Robertson (S#1112969) Serial:	YES	Comprises test frame, control system and furnace.	Custom work surface	8	400	4X6	15X13	1220 x 1830	4575 x 3965	Normal	High	No	Yes	No	230 VAC 1Ph, 20 A	230 VAC 1Ph, 20 A	120 VAC 1Ph, 15 A			Building Process	No	Yes	No	None	Air		None	None					Other (Specify)	HT Bench 72"				Y	Y	already part of column S	already part of column T

ID	REVIT Type ID	OLD Space Code (Building & Rm No.)	NEW Space Code	Name	Manufacturer (Make & Model)	Considered for Functional Program	Notes	Notes Other
136	0	NRC-M13-045	3.23 Material and Component Testing	MTS FT40 Controller #17 $55k Capitalization date 2010/06/30 10 year amortizat	MTS TESTING SYSTEMS (S#1003151) Serial:02072701D	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.	
137	E161	NRC-M13-045	3.23 Material and Component Testing	MTS Landmark Frame #16 $113k Capitalization date 2010/06/30 10 year amortizat	MTS TESTING SYSTEMS (S#1003151) Serial:10311101	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack
138	0	NRC-M13-045	3.23 Material and Component Testing	MTS FT40 Controller #16 $55k Capitalization date 2010/06/30 10 year amortizat	MTS TESTING SYSTEMS (S#1003151) Serial:02072710D	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.	
139	E139	NRC-M13-121	3.9 HTM R&D Lab	Zeta Potentiometer Taylor Robertson - 65K	Rick Kearsey - Taylor Robertso (S#1102804) Serial:	YES	This equipment is opeated from a work bench. Seating in front of the equipment is required for operation.	
140	E141	NRC-M13-103A	3.12 HTM Prep Room	UB25/115 UB25 UNIBOND LINEAR DC PWR. SUPPLY 50A/24 WELD HEAD, LF, AIR light force vert. motion	VIRO MART LIMITED (S#1010049) Serial:(AMR 33383-1)	YES	This equipment is operated from a workbench in which the opeator is in a seated position.	We have a second welder not on this assets list due to age with a similar 2'x3' footprint occupied on a bench that allows equipment to be operated from seated position.
141	0	NRC-M13-148A	4.9 HTM Testing Equipment Storage	Digital controller MTS FT40 Luc Lafleur $66k for servo hydraulic MTS Frame	MTS Rick Kearsey (S#1077552) Serial:	no	Equipment is usually placed into 19" x 36" deep standard rack mount. Occupies footprint of rack mount an standard test frame unit cell.	
142	E30	NRC-M13-MAT PROC	3.9 HTM R&D Lab	Glove Box (Material Processing Fac) Ryan MacNeil $15k	Scott Yandt (S#1092008) Serial:	YES	uses vacuum pump	Gas Bottle - Ag/N2
143	0	NRC-M13-146B	3.22 Metallographic Sample Preparation	Fume Hood Olga Lupandina $32K AUC 8-4229	(S#) Serial:	no		This will be abandoned in existing building (M13).
144	E31	NRC-M13-044	4.9 HTM Testing Equipment Storage	Interferometer Strain/Displacement Gage Taylor Robertson - 43K - A1-009845 see 40541	(S#) Serial:	YES	When in use, fits in frame footprint.	
145	E32	NRC-M13-146B	3.22 Metallographic Sample Preparation	LaboSystems Grinder/Polisher Machine-Spec.Prep Olga Lupandina $22k	STRUERS A/S (S#30322295) SN063610679/SN06310664	YES	Requires water hook up, drain, compressed air. Drain should have sediment trap.	Power type: 240V,1Ph, 15A. Unit connected to revesible transformer 120V,1 Ph, 15A
146	E33	NRC-M13-146B	3.22 Metallographic Sample Preparation	CitoPress-5 mounting press for specimens Olga Lupandina - $15k	STRUERS A/S. (S#3032294) Serial:SN57711909	YES	Requires water hook up and drain.	4x Standard Storage cabinets for consumables.
147	0	NRC-M13-045	3.23 Material and Component Testing	High temperature furnace for material testing Luc Lafleur $16K	Dr. Scott Yandt (S#1009026) Serial:	no	Fits within frame footprint when installed; occupies 3x3x3 space in storage.	
148	0	NRC-M13-045	3.23 Material and Component Testing	Power supply & converter for UHCF material testing Luc Lafleur 21K	Luc Lafleur (S#1042262) Serial:	no	Equipment is usually placed into 19" x 36" deep x 22U rack. When in rack it occupies the rack footprint; in a standard test machine unit cell. Equipment also requires compressed air.	
149	0	NRC-M13-045	3.23 Material and Component Testing	Fotonic sensor controller for UHCF material testin AERO Luc Lafleur 10K	Custodian: Luc Lafleur (S#1059511) Serial:	no	Equipment is usually placed into 19" x 36" deep x 22U rack. When in rack it occupies the rack footprint; in a standard test machine unit cell.	
150	0	NRC-M13-148B	3.23 Material and Component Testing	PXIe Controller/Data Acquisition for 2nd UHCF mat. Luc Lafleur - 14k	Dr. Scott Yandt (S#) Serial:	no	Fits in footprint of test frame within test frame unit cell. Occupies 1x1x1 when in storage.	
151	0	NRC-M14-110A	3.25 Non Destructive Evaluation	SENSOR,NORTEC 2000 DUAL FREQUENCY,m#:9020210.04	STAVELY NDT TECHNOLOGIES INC (S#1042286) Serial:N2000D1475G011958	no		
152	E34	NRC-M14-YARD	1.1 NRC High Bay	TRUCK, PROPANE POWERED PNEUMATIC TIRE LIFT, CAP: transfer to AERO Andy Christie	PSI PERIPHERAL SOLUTIONS INC. (S#1017825) Serial:JPX2302519155	YES	Used by SMPL but can be shared with TSB Should not be crossed out	
~~153~~	~~0~~	~~NRC-M14-130~~	~~3.25 Non Destructive Evaluation~~	~~SCANNER, X RAY FILM SCANNER VXR-12, 12 BIT GRAY SC Brothers (Going Surplus)~~	~~VIDAR SYSTEMS CORPORATION (S#) Serial:21714~~	~~no~~		
154	E52	NRC-M14-PUMPHOUS	4.2 Pump Room	POWER SUPPLY SYSTEM HYDRAULIC,MTS,140 G.P.M.,506.8 see 22534 - same bc	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:225	YES	Hydraulic Pumps Notes " All hydraulic pumps in M-03,M-13 and M-14 should be combinded into 1 pump room that houses 1 to 3 pumps to supply hydraulic power to the entire lab." This point need will more discussion but a room or space approx 30x30 may be required depending on how many pumps are decieded upon. The M-14 pump house is approx 12X30 and is about right for 1 pump. Crane access would be prefered so some discussion on installing the pumps in the mid or high bay may be in order.	2 NEW pumps required for SI MTS Mod 515.150 for FST 40" X169" X78" h. foot print 8' X20' (E52-A) MTS Mod 515.90 For Mat & comp Test 40" X113" X78" h. foot print 8' X16' (E52-B) Lifting beam required over pump Could consider putting these pumps in the corner of the full scale test high bay if close to Mat and comp test lab. No UPS required for SI lab. This does not include HTM requirements
155	0	NRC-M14-130	3.25 Non Destructive Evaluation	REFLECTOSCOPE ULTRASONIC, SPERRY S-80 (Going Surplus)	PSI PERIPHERAL SOLUTIONS INC. (S#1017825) Serial:11610-0	no		
156	0	NRC-M14-116	3.25 Non Destructive Evaluation	X-RAY UNIT,SPERRY SPX 160 KV,PORTABLE,M#:160EA-8 (Going Surplus)	(S#1017825) Serial:20011-0	no		
157	0	NRC-M14-140	3.25 Non Destructive Evaluation	TURNTABLE ULTRASCAN 24 C/W DRIVE MOTOR,MODEL:2024 brothers	(S#1017825) Serial:	no	Part of item 159	
158	0	NRC-M14-140	3.25 Non Destructive Evaluation	INSPECTION SYSTEM EDDY CURRENT, ROHMANN ELOTEST LO	PSI PERIPHERAL SOLUTIONS INC. (S#1017825) Serial:88152	no		
159	E35	NRC-M14-140	3.25 Non Destructive Evaluation	INSPECTION SYSTEM ULTRASONIC,C/W SCANNER,ULTRASC	(S#) Serial:	YES	assume 63 lbs per cubic foot of water 12x22x4	assume 63 lbs per cubic foot of water 12x22x4; requires compressed air and city water
160	0	NRC-M14-140	3.25 Non Destructive Evaluation	TECVIEW 3D CONTOUR MODULE	(S#1072114) Serial:	no		
~~161~~	~~E36~~	~~NRC-M14-108~~	~~2.5 Machine Workshop~~	~~LATHE TRANSOCEAN MACH. GRACIANO 17 SAG,MODEL:14~~	~~(S#1017825) Serial:SAG17NIC125~~	~~no~~		
162	E37	NRC-M14-108C	2.5 Machine Workshop	GRINDER,SURFACE MIKROMAT,8 X 24 WORKING SURFACE,SF	(S#1017825) Serial:3401-1/62.19	YES	Requires 36" between the back of the machine and wall	
163	E38	NRC-M14-108	2.5 Machine Workshop	MILLING MACHINE,HITACHI,VERT. MILLING,MODEL:TYPE 2	(S#1017825) Serial:8705934	YES	Requires 36" between the back of the machine and wall	
164	E39	NRC-M14-108	2.5 Machine Workshop	MILLING MACHINE UNIVERSAL KNEE,MODEL:VPU-201 Transfer to AERO	Universal (S#1017825) Serial:178640	YES	Requires 36" between the back of the machine and wall.	
165	E40	NRC-M14-108C	2.5 Machine Workshop	ELECTRIC DISCHARGE MACHINE ELERODA,C/W ISOPULSE,10	(S#1017825) Serial:53254	YES	Hood required - Shared This Vacuum is used for the CNC Milling m/c and the EDM m/c Requires 36" between the back of the machine and wall.	
166	E41	NRC-M14-100	1.1 NRC High Bay	TESTING MACHINE BALDWIN TESTING 600K CAPACITY	(S#1017825) Serial:S046210	YES	Needs Hydraulic Supply. Requires extra floor reinforcement. To be replaced	
167	0	NRC-M14-100	1.1 NRC High Bay	MTS Grip controller HYDRAULIC,115 VOLT AC,685.10A	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:123	no		
168	E42	NRC-M14-110A	3.25 Non Destructive Evaluation	MAG V MAGNAFLUX,MAGNETIC PARTICLE INSPECTION UNIT	(S#1017825) Serial:831780	YES	Requires 230V 200A circuit ?? Look live it should be 600V, 100A	MPI / LPI Area shall be black out area – should consider a separate room with direct access to NDE lab No windows Requires compressed air and special ventilation
169	E133	NRC-M14-100A	3.23 Material and Component Testing	LOAD FRAME MTS#2, 100 TON/220KIP,MODEL:311.31 >TXT #1 load frame bc 3005754 DEACTIVATED	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:306	YES	Needs Hydraulic Supply and existing UPS Needs 208 3 phase and 600V power available close by for environmental test chambers. Load Frame # 15	
170	E43	NRC-M14-110A	3.25 Non Destructive Evaluation	INSPECTION SYSTEM, LIQUID PENETRANT (SEVEN STATIO	QUALITY NDE LTD (S#1017825) Serial:	YES	Requires exhaust system Should not be crossed out	MPI / LPI Area shall be black out area – should consider a separate room with direct access to NDE lab No windows Eyewash station Localise exhaust, negative pressure Chemical storage cabinet Requires compressed air city water and special ventilation
171	0	NRC-M14-208	2.3 Instrumentation Workshop	METER,DIGITAL,VOLT,MEASURING UNIT,M#:DK38S6(79829)	SUMMAGRAPHICS (S#1017825) Serial:25295	no	small desk/table top equipment.	
172	0	NRC-M14-140SHEET	3.25 Non Destructive Evaluation	EDDY CURRENT INSTRUMENT,C/W 2 ANALOG BOARDS,MIZ-40 in computer - rm 140 sheet	Q. C. INSTRUMENTS LIMITED (S#1017825) Serial:2	no	Should be replaced with new central pump system	
173	0	NRC-M14-140	3.25 Non Destructive Evaluation	HOLDER,SPECIMEN,INDEXER,BAR STOCK,CU-2900 INSTALLE	QC INSTRUMENTS LTD (S#1017825) Serial:	no		
174	0	NRC-M14-140	3.25 Non Destructive Evaluation	C-SCAN UPGRADE GIMBAL ASSEMBLY,SERVO-AMPLIFIER	TEKTRON (S#1008554) Serial:	no		
175	E44	NRC-M14-118A	3.14 Burner Rig #1	COMBUSTOR SYSTEM,BECON INCORPORATED,P.O.3105353270	BECON INC (S#1017825) Serial:	YES	This equipment requires a room conforming to Becon Specifications which are available. See supplimentary data for electrical requirements. It would be preferred to provide facility installation drawings to Frameworks because integration into building services and infrastructure is complex.	Special Power needs to be run through Control Room so equipment can be controlled. Specific meeting suggested
176	E52	NRC-M14-PUMPHOUS	4.2 Pump Room	POWER SUPPLY, HYDRAULIC MTS 30 U.S.GPM@3000 PSI	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:96091201	YES	Should be replaced with new central pump system	See comment Item ID 154
177	E173	NRC-M14-140	3.25 Non Destructive Evaluation	X-RAY SYSTEM, PORTABLE LORAD LPX-160. brothers (SAME AS 29490)	Q. C. INSTRUMENTS LIMITED (S#1017825) Serial:	YES	X-ray room require high height door, and several high power circuits 2 x 250V 30A & 240V 30A	Space holder for the X-room, rate for 240kV changed to YES
178	0	NRC-M14-130	3.25 Non Destructive Evaluation	MEASUREMENT SYSTEM, RAM 10000 POWER FRAME C/O SYNT	(S#) Serial:1354	no		

ID	Equipment height (ft)	Equipment weight (lbs)	Foot Print WxL (ft)	Ideal Area Required WxL (ft)	Footprint Metric WxL (metric)	Ideal Area Required WxL (metric)	Ideal Room Height	Power Requirement (Req' more than 120V)	Fuel Consumed	Process Cooling Required	Back-up Power Required	Primary Power	Secondary Power	Tertiary Power	Quartenary Power	Additional Power
136	1	50	2x3									110 VAC, UPS				
137	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay	High	No	Yes	Yes	Hydraulic	110 VAC, UPS			
138	1	50	2x3													
139	2	50	2x2	2x2	610 x 610		Normal	Normal	No	No	No	120 VAC 1Ph, 15 A				
140	2	100	2x3	2x3	610 x 915							110 VAC, 15A				
141	1	100	2x3									110 VAC, UPS				
142	8	300	4x6	10 x 6	3050 x 1830	3050 x 1830	Normal	Normal	No		No	120 VAC 1Ph, 15 A				
143																
144	5	20	4x4	4x4	1830 x 915		Mid-bay	High	No	Yes	Yes	120 VAC 1Ph, 15 A				
145	2	150	1.5x2.5	4.5x7.5	455 x 765	1375 x 2285	Normal	Normal	No	Yes	No	230 VAC, 15 A	None	None	None	No
146	2	100	1.5x1.5	5x5	455 x 455	1525 x 1525	Normal	Normal	No	Yes	Yes	230 VAC, 15A	None	None	None	No
147	3	100	3x3									230 VAC, 20A UPS				
148	1	50	2x3									230 VAC, 20A UPS				
149	1	50	2x3									110 VAC, UPS				
150	1	30	1x1									110 VAC, UPS				
151																
152	mobile truck	mobile truck	4X12	8X16	1220 x 3660	2440 x 4880	High-bay					Propane				
~~153~~																
154	4-8 ft height range	less than 10000 lb.	See Hdy Pump Note	See Hdy Pump Note			Mid-bay	High	No	Yes		600V 400A breaker Hydraulic Pump Current TBD depending on number and size of pumps chosen. Likley should plan for 3 circuits of 600V 400A and revise down if only 2 pumps are required or smaller pumps are chossen.				
155																
156																
157	8	200														
158																
159	8	66500	12 X22	20 X30	3660 x 6710	6100 x 9150	Normal									
160																
~~161~~			~~4x8~~	~~9x15~~	~~1220 x 2745~~	~~2745 x 4575~~	~~Mid-bay~~	~~High~~	~~No~~	~~No~~	~~No~~					
162	4-8 ft height range	less than 5000 lb.	5x7	8x15	1525 x 2135	2440 x 4575	Mid-bay	High	No	No	No	600V 15A breaker				
163	4-8 ft height range	less than 10000 lb.	6x6	10x14	1830 x 1830	3050 x 4270	Mid-bay	High	No	No	No	600V 15A breaker				
164	4-8 ft height range	less than 5000 lb.	7x11	15x15	2135 x 3355	4575 x 4575	Mid-bay	High	No	No	No	600V 20A breaker				
165	4-8 ft height range	less than 1000 lb.	5x7	10x10	1525 x 2135	3050 x 3050	Mid-bay	High	No	No	No	600V 15A breaker				
166	12-16 ft height range		12X12	20X20	3660 x 3660	6100 x 6100	High-bay	High	No	No	No	not moving replacement needs 110V 20A and Hydraulic power				
167	4 ft	less than 500 lb	2X2	2X2			High-bay					110V				
168	8	1000	3x8	8x12	915x2440	2440x3660	Normal	600V 100A	No	No	No					
169	12-16 ft height range	less than 5000 lb.	11X3	15x9	3355 x 915	4575 x 2745	Mid-bay	Normal	No	No	no	See Note				
170	8	1000	3 X12	8 X20	915 x 3660	2440 x 6100	Normal	Normal	No	No	No					
171	n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	110V				
172																
173																
174																
175	10	2000	9 X 20	15 X 20	2745 x 6100	4575 x 6100	Mid-bay	Normal	Yes	No	Yes					No
176			see comment 154													
177	10		20x20	20x20			10' door	2 x 250V 30A & 240V 30A								
178																

ID	Process Cooling	City Water Backup	Compressed Air	City Water Supply	Effluent Plumbing Requirements	Compressed Gases	Natural Gas used?	Flammable Compressed Gases	Special Ventilation	Operating temperatures (deg Celsius)	Sensitive to vibrations?	Noisy equipment?	Lifing Aids	Primary Work Surface	Secondary Work Surface	Equipment Rack	Storage Type	Additional Spec Sheet Available	Network Connection (Y/N)	External Dedicated Equipment (Y/N)	External Dedicated Equipment Dimensions (W x L x H inches)	External Dedicated Equipment Clearance (inches)
136																						
137																			Y	Y	already part of column S	already part of column T
138																						
139														Standard 72" Bench					N	N	N/A	N/A
140																			N	N	N/A	N/A
141																						
142	None	No	No	No	None	UHP Argon		None	Vacuum Exhaust					Standard 36" Bench					N	N	N/A	N/A
143																						
144																			N	N	N/A	N/A
145	None	No	Yes	Yes	Solids Sediment Trap	None	none	None	None	ambient	no	no	None	Standard 72" Bench	None	none	Standard Cabinet 36" Wide	N/A	N	N	N/A	N/A
146	None	No	No	Yes	None	None	none	None	None	ambient	no	no	None	Standard 60" Bench	None	none	Standard Cabinet 36" Wide	N/A	N	N	N/A	N/A
147																						
148			Yes																			
149																						
150																						
151																						
152		n/a		n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
~~153~~																					~~N/A~~	~~N/A~~
154	cooling tower water	n/a	compressed air is required throughout the lab	n/a	n/a	n/a	n/a	n/a				TBD on replacement Pumps	lifting aid requird for maintenance						N	Y	already part of column S	already part of column T
155																						
156																						
157																						
158																						
159			X	X															Y	Y	already part of column S	already part of column T
160																						
~~161~~				~~n/a~~	~~n/a~~							~~n/a~~									~~N/A~~	~~N/A~~
162		n/a		n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
163		n/a		n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
164		n/a		n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
165		n/a		n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
166		n/a		n/a	n/a	n/a	n/a	n/a				n/a							N	Y	already part of column S	already part of column T
167		n/a		n/a	n/a	n/a	n/a	n/a				n/a										
168			x						x										N	N	N/A	N/A
169		n/a		n/a	n/a	n/a	n/a	n/a				n/a						Yes	Y	Y	already part of column S	already part of column T
170			x	x					x										N	N	N/A	N/A
171		n/a		n/a	n/a	n/a	n/a	n/a				n/a										
172	cooling tower water	n/a		n/a	n/a	n/a	n/a	n/a				TBD on replacement Pumps										
173																						
174																						
175	None	No	Yes	Yes	Oil Seperator	Nitrogen	No, but equipment can burn NG. We would like to have NG available to this equipment for future connection.	None	Combustion Exhaust. Approximately 8000 CFM make up air and 8000 CFM for exhaust.	`-20C to +45C		Yes, 130 dB+	None	HT Bench 72"	None		Standard Cabinet 36" Wide		Y	Y	already part of column S	already part of column T
176	cooling tower water	n/a		n/a	n/a	n/a	n/a	n/a				TBD on replacement Pumps							Y	Y	already part of column S	N/A
177																			Y	Y	already part of column S	N/A
178																			Y	Y		

ID	REVIT Type ID	OLD Space Code (Building & Rm No.)	NEW Space Code	Name	Manufacturer (Make & Model)	Considered for Functional Program	Notes	Notes Other	Equipment height (ft)	Equipment weight (lbs)	Foot Print WxL (ft)	Ideal Area Required WxL (ft)	Footprint Metric WxL (metric)	Ideal Area Required WxL (metric)	Ideal Room Height	Power Requirement (Req' more than 120V)	Fuel Consumed	Process Cooling Required	Back-up Power Required	Primary Power	Secondary Power	Tertiary Power	Quaternary Power	Additional Power	Process Cooling	City Water Backup	Compressed Air	City Water Supply	Effluent Plumbing Requirements	Compressed Gases	Natural Gas used?	Flammable Compressed Gases	Special Ventilation	Operating temperatures (deg Celsius)	Sensitive to vibrations?	Noisy equipment?	Lifing Aids	Primary Work Surface	Secondary Work Surface	Equipment Rack	Storage Type	Additional Spec Sheet Available	Network Connection (Y/N)	External Dedicated Equipment (Y/N)	External Dedicated Equipment Dimensions (W x L x H inches)	External Dedicated Equipment Clearance (inches)
179	0	NRC-M14-140	3.25 Non Destructive Evaluation	RECEIVER, UT340 PULSER RECEIVER SYSTEM INCLUDING G	UTEX SCIENTIFIC INSTRUMENTS I (S#) Serial:340B117	no																																					Y	Y		
180	0	NRC-M14-130	3.25 Non Destructive Evaluation	SCANNER, ZETEC MIZ-22 EDDY CURRENT TEST INSTRUMENT Blue Box	QC INSTRUMENTS (S#) Serial:215	no																																					Y	Y		
181	0	NRC-M14-140	3.25 Non Destructive Evaluation	CAMERA,HAND HELD VIDEO INSPECT PEN,M#:VIP-1F brothers (SAME AS 29490) (Going Surplus)	FLOLITE INDUSTRIES (S#) Serial:	no																																					N	N	N/A	N/A
182	0	NRC-M14-100SHEET	1.1 NRC High Bay	ACTUATOR,W/SERVO VALVE,SWIVEL HEADS,1QT,244.12A-07	(S#) Serial:372971	no	needs to be stored with crane access. Used for high bay work 2'X2'x 9' equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
183	0	NRC-M14-100SHEET	1.1 NRC High Bay	ACTUATOR, W/SERVO VALVE, SWIVEL HEADS, 1 QT. ACCUM	(S#) Serial:372886	no	needs to be stored with crane access. Used for high bay work 2'X2'x 9' equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a							Y	Y		
184	0	NRC-M14-100SHEET	1.1 NRC High Bay	ACTUATOR, W/SERVO VALVE, SWIVEL HEADS, 1 QT. ACCUM	(S#) Serial:372969	no	needs to be stored with crane access. Used for high bay work 2'X2'x 9' equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a							N	N		
185	0	NRC-M14-100SHEET	1.1 NRC High Bay	ACTUATOR, W/SERVO VALVE, SWIVEL HEADS, 1 QT. ACCUM	(S#) Serial:372970	no	needs to be stored with crane access. Used for high bay work 2'X2'x 9' equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
~~186~~	~~0~~	~~NRC-M14-110~~	~~Not Assigned (LAB AMTC Not Included)~~	~~ULTRASONIC PROCESS CLEANING TANK, MODEL UCS-8885~~	~~(S#1027856) Serial:99-51-44~~	~~no~~																																							~~N/A~~	~~N/A~~
187	0	NRC-M14-116	3.25 Non Destructive Evaluation	X-RAY, IMAGE INTENSIFIER, CCD CAMERA, CONTROL UNIT brothers (SAME AS 29490) (Going Surplus)	THOMSON TUBES (S#1025308) Serial:556218	no																																								
~~188~~	~~0~~	~~NRC-M14-103~~	~~3.25 Non Destructive Evaluation~~	~~REMOVED (was ZIMAC AUTOMATIC LOAD COMPENSATING HOT BONDER SYSTE Simon Hind AMTC)~~	~~0~~	~~no~~																																							~~N/A~~	~~N/A~~
~~189~~	~~0~~	~~NRC-M14-103~~	~~3.25 Non Destructive Evaluation~~	~~REMOVED (was ZIMAC AUTOMATIC LOAD COMPENSATING HOT BONDER SYSTE Simon Hind AMTC)~~	~~0~~	~~no~~																																							~~N/A~~	~~N/A~~
~~190~~	~~0~~	~~NRC-M14-103~~	~~3.25 Non Destructive Evaluation~~	~~REMOVED (was ZIMAC AUTOMATIC LOAD COMPENSATING HOT BONDER SYSTE Simon Hind AMTC)~~	~~0~~	~~no~~																																							~~N/A~~	~~N/A~~
~~191~~	~~0~~	~~NRC-M14-103~~	~~3.25 Non Destructive Evaluation~~	~~REMOVED (was ZIMAC AUTOMATIC LOAD COMPENSATING HOT BONDER SYSTE Simon Hind AMTC)~~	~~0~~	~~no~~																																							~~N/A~~	~~N/A~~
192	~~0~~	~~NRC-M14-110~~	~~Not Assigned (LAB AMTC Not Included)~~	~~CORROSION TEST CHAMBER, M#:SCCH#22,SINGLETON,240V ALSO FOUND 3005234 NOT IN SAP~~	(S#1012062) Serial:22-13399	no																																							N/A	N/A
193	0	NRC-M14-140	3.25 Non Destructive Evaluation	METER,SIGMATEST D CONDUCTIVITY METER,MODEL:1377388 brothers	FOERSTER INSTRUMENTS, INC. (S#1051083) Serial:1455	no																																								
194	0	NRC-M14-116	3.25 Non Destructive Evaluation	FILM PROCESSOR MODEL:M6I INDUSTRIAL X-RAY FILM (Going Surplus)	KODAK (S#1040616) Serial:150021	no																																								
195	0	NRC-M14-140	3.25 Non Destructive Evaluation	PULSE GENERATOR,100V/2A PROGRAMMABLE	AGILENT TECHNOLOGIES (S#1041566) Serial:DE38601671	no																																								
~~196~~	~~0~~	~~NRC-M14-118A~~	~~3.14 Burner Rig #1~~	~~DUPLICATE - COMBUSTOR SYSTEM,LABORATORY,/W FUEL CONTROL~~	~~BECON INC. (S#1010591) Serial:02-5625~~	~~no~~	~~DUPLICATE~~																																						~~N/A~~	~~N/A~~
197	E174	NRC-M14-118	3.13 Burner Rig Control Room	upgrade to 21054,COMBUSTOR SYSTEM,LABORATORY David Chow	BECON INC. (S#1010591) Serial:02-5625	YES	Operator control console and 42 U hardware rack.	Changed from No to YES in column N	6	500	3x8	3x8	915 x 2440	915 x 2440						110 VAC																							Y	Y	already part of column S	N/A
198	E45	NRC-M14-140	3.25 Non Destructive Evaluation	ECHOTHERM CENTRAL UNIT 140K > TXT	(S#1042983) Serial:	YES			8	100	4x4	8X8	1220 x 1220	2440 x 2440	Normal	Normal	No	No	No																								Y	N	N/A	N/A
199	0	NRC-M14-140	3.25 Non Destructive Evaluation	ECHOTHERM ILLUMINATIN HEAD FOR SCANNING SYSTEM AUC 800000002479 > 21655_1	Marc Genest (S#1042983) Serial:135	no			8	20																																				
200	0	NRC-M14-140	3.25 Non Destructive Evaluation	upgrade to ECHOTHERM / THERMOSCOPE$75K Marc Genest,Dany Paraschivoiu,Nick Belinger 8-2479	Marc Genest (S#1042983) Serial:135	no			8	-						Normal & 220V 15A																														
201	0	NRC-M14-140	3.25 Non Destructive Evaluation	FLIR SC3000 THERMACAM IR CAMERA	FLIR SYSTEMS INC. (S#1042983) Serial:12510029	no																																								
202	E46	NRC-M14-108	2.5 Machine Workshop	DOALL SERIES C-916S CUT-OFF SAW,/W SILENCER	DOALL MONTREAL, INC. (S#1000135) Serial:529-011142	YES	Requires 36" between the back of the machine and wall.		4-8 ft height range	less than 5000 lb.	4x4	12x12	1220 x 1220	3660 x 3660	Mid-bay	High	No	No	No	600V 30A breaker						n/a		n/a	n/a	n/a	n/a	n/a				n/a						Yes	N	N	N/A	N/A
203	0	NRC-M14-130	3.25 Non Destructive Evaluation	FLAW DETECTOR,EPOCH 4 DIGITAL ULTRASONIC brothers	(S#1006563) Serial:21394403	no																																								
204	0	NRC-M14-140	3.25 Non Destructive Evaluation	IMAGING UNIT,PORTABLE ILLUMINATION HOOD,1YR WARRAN brothers	(S#1037583) Serial:	no																																								
205	0	NRC-M14-140	3.25 Non Destructive Evaluation	IMAGING UNIT,PORTABLE ILLUMINATION HOOD old bc 237891	(S#1037583) Serial:	no																																								
206	0	NRC-M14-140	3.25 Non Destructive Evaluation	STAVELEY NORTEC 2000D EDDY CURRENT KIT email confirm Andy Christi	NON-DESTRUCTIVE PRODUCTS LIMIT (S#1054945) Serial:N2000D1509H012439	no																																								
207	0	NRC-M14-100	1.1 NRC High Bay	COLD WORKING KIT N6640 TOOL CABINET,FTI-CVORK-1A	(S#1055152) Serial:	no	tool Box, Portable		4 ft	less than 500 lb.	3X3									n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
208	E47	NRC-M14-108	2.5 Machine Workshop	TONE FAN RADIAL DRILLING MACHINE 900 FROM FERNDALE	FERNDALE MACHINERIE (S#1058411) Serial:3669	YES	Requires 36" between the back of the machine and wall.		4-8 ft height range	less than 5000 lb.	3x7	9x10	915 x 2135	2745 x 3050	Mid-bay	High	No	No	No	600V 20A breaker						n/a		n/a	n/a	n/a	n/a	n/a				n/a						Yes	N	N	N/A	N/A
209	0	NRC-M14-100	1.1 NRC High Bay	DATA ACQUISITION SYSTEM FROM MTS for $62,805US Andrew Christie	MTS TESTING SYSTEMS (S#1003151) Serial:	no	desk top item		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	110V						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
210	0	NRC-M14-100	1.1 NRC High Bay	Additional funds for Data Acquistion Sys $55,500US old bc 238835 Andrew Christie	MTS SYSTEMS CORPORATION (S#1009132) Serial:	no	incorporated into item 210		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	110V						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
211	0	NRC-M14-100	1.1 NRC High Bay	upgrade for DATA ACQUISITION SYSTEM for $77,944 Andrew Christie,req. JV from chantal Lalande 4-Jan	MTS TESTING SYS JV3118428084 (S#1003151) Serial:	no	incorporated into item 210		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	110V						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
212	0	NRC-M14-140	3.25 Non Destructive Evaluation	EDDY CURRENT SYSTEM,MODEL:ELOTEST M2 brothers	EDDY CURRENT INSTRUMENT (S#1036164) Serial:30258	no																																								
213	E48	NRC-M14-108	2.5 Machine Workshop	HYDRAULIC SHEARER,NATIONAL NH4825 N3600	NATIONAL (S#1065034) Serial:	YES	cannot back onto wall. Needs 8 ft clearance		4-8 ft height range	less than 5000 lb.	7x10	16x18	2135 x 3050	4880 x 5490	Mid-bay	High	No	No	No	600V 15A breaker						n/a		n/a	n/a	n/a	n/a	n/a				n/a						Yes	N	N	N/A	N/A
214	E49	NRC-M14-140	3.25 Non Destructive Evaluation	OPTICAL TABLE MODEL:M-RS4000-48-12 RESEARCH NEWPOR	NEWPORT INSTRUMENTS (S#1003238) Serial:3736	YES			8	2500	4X8	12X16	1220 x 2440	3660 x 4880	Normal	Normal	No	No	No																							Yes	N	N	N/A	N/A
215	0	NRC-M14-100SHEET	1.1 NRC High Bay	FATIGUE TEST ACTUATOR ASSEMBLY 1.1 KIP /W BRIDGE	MTS TESTING SYSTEMS (S#1003151) Serial:10166307A	no	equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
216	0	NRC-M14-140	3.25 Non Destructive Evaluation	BONDMASTER MULTI MODE INSTRUMENT,MODEL:1000	(S#1054945) Serial:1000BM000K061317	no																																								
217	0	NRC-M14-100SHEET	1.1 NRC High Bay	HYDRAULIC ACTUATOR,LINEAR,model:244.12, 10 stroke<N	MTS TESTING SYSTEMS (S#1003151) Serial:10180842	no	equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
218	0	NRC-M14-100SHEET	1.1 NRC High Bay	FATIGUE TEST ACTUATOR ASSEMBLY 1.1 KIP	MTS TESTING SYSTEMS (S#1003151) Serial:10166307B	no	equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
219	0	NRC-M14-100	1.1 NRC High Bay	6 CHANNEL VALVE DRIVER Sys1	SPECTRA RESEARCH CORPORATION (S#1006905) Serial:1470055D	no	incorporated into a controller		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
220	0	NRC-M14-100	1.1 NRC High Bay	DUAL BRIDGE,LOAD CELL 100K RANGE,m#:1632-AJH-100K SCRAP	INTERFACE INC. (S#1054810) Serial:118662	no	equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
221	0	NRC-M14-116	3.25 Non Destructive Evaluation	FILM PROCESSOR,KODAK,NOIBN,M35A (Going Surplus)	KODAK (S#1000557) Serial:309006	no																																								
~~222~~	~~0~~	~~NRC-M14-103~~	~~3.25 Non Destructive Evaluation~~	~~SCXI DAQ SYS MULTIFUNCTION 16 BIT (in ZIMAC)~~	~~(S#1025953) Serial:HA1779790~~	~~no~~																																							~~N/A~~	~~N/A~~
223	E175	NRC-M14-122	3.20 Microscope Lab	NIKON SMZ1000, C-PS160, SEREO MICROSCOPE	NIKON, JAPAN, (S#3006950) Serial:1006147	YES	requires an individual booth to ensure dark working enviornment	Requires installation on vibration suppressing table.	3.5	100	5x2.5	5x8	152 x 760	157 x 243	normal	normal	no	no	no	120 VAC 1Ph, 15 A	none	none	none	none	none	no	no	no	None	None		None	None	ambient	yes	no	None	none	None	none		no	Y	Y	already part of column S	already part of column T
224	0	NRC-M14-100	1.1 NRC High Bay	6 CHANNEL VALVE DRIVER	SPECTRA RESEARCH CORPORATION (S#1006905) Serial:1470057D	no	incorporated into a controller		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
225	0	NRC-M14-100SHEET	1.1 NRC High Bay	HYDRUALIC ACTUATOR,LINEAR,model:244.12, 24 stroke	MTS TESTING SYSTEMS (S#1003151) Serial:10180848A	no	equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
226	0	NRC-M14-100SHEET	1.1 NRC High Bay	HYDRUALIC ACTUATOR,LINEAR,model:244.12, 24 stroke	MTS TESTING SYSTEMS (S#1003151) Serial:10180848B	no	equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
227	0	NRC-M14-100SHEET	1.1 NRC High Bay	HYDRUALIC ACTUATOR,LINEAR,model:244.12, 10 stroke	MTS TESTING SYSTEMS (S#1003151) Serial:10180843	no	equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
228	0	NRC-M14-100SHEET	1.1 NRC High Bay	HYDRUALIC ACTUATOR,LINEAR,model:244.12, 06 stroke	MTS TESTING SYSTEMS (S#1003151) Serial:10180845	no	equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
229	0	NRC-M14-100SHEET	1.1 NRC High Bay	HYDRUALIC ACTUATOR,LINEAR,model:244.11, 16 stroke	MTS TESTING SYSTEMS (S#1003151) Serial:10181344	no	equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
230	0	NRC-M14-100SHEET	1.1 NRC High Bay	HYDRUALIC ACTUATOR,LINEAR,model:244.22, 10 stroke	MTS TESTING SYSTEMS (S#1003151) Serial:10180844A	no	equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
231	0	NRC-M14-100SHEET	1.1 NRC High Bay	HYDRUALIC ACTUATOR,LINEAR,model:244.22, 20 stroke	MTS TESTING SYSTEMS (S#1003151) Serial:10181209	no	equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
232	0	NRC-M14-100SHEET	1.1 NRC High Bay	HYDRUALIC ACTUATOR,LINEAR,model:244.22, 10 stroke	MTS TESTING SYSTEMS (S#1003151) Serial:10180844B	no	equipment stored on shelving until required on a test rig		n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
233	0	NRC-M14-140	3.25 Non Destructive Evaluation	OMNISCAN PHASED ARRAY 32:125 SYSTEM	(S#1029096) Serial:	no																																								
234	E50	NRC-M14-108	2.5 Machine Workshop	LATHE HARDINGE,SUPER PRECISION HIGH SPEED(#21936)	HARDINGE UNIVERSAL (S#1017825) Serial:HLV-H-1734	YES	Requires 36" between the back of the machine and wall.		4-8 ft height range	less than 5000 lb.	3.5x6	8.5x14	1065 x 1830	2595 x 4270	Mid-bay	High	No	No	No	600V 15A breaker						n/a		n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
235	E51	NRC-M14-140E	3.25 Non Destructive Evaluation	OPTICAL TABLE -CLEANTOP II,TMC-784-455-12R Multi-Scanner TG near window	HARVARD APPARATUS CANADA (S#1006157) Serial:121205	YES					7X12	16X20	2135 x 3660	4880 x 6100	Normal	Normal	No	No	No																								N	N	N/A	N/A
236	E51	NRC-M14-140	3.25 Non Destructive Evaluation	PEC GANTRY SYSTEM	(A.FAHR) (S#1072114) Serial:	YES	part of 235 (sits on top of 235)		8	2500	7x12	16X20																															Y	Y	already part of column S	already part of column T
237	E35	NRC-M14-140	3.25 Non Destructive Evaluation	INTEGRATED IMMERSION AND REMOTE CONT SYS	(S#1072114) Serial:	YES	Part of item 159		8	50	See Notes																																N	N	N/A	N/A
238	E52	NRC-M14-PUMPHOUS	4.2 Pump Room	HYDRAULIC PUMP -REMAN DENISON part of 140 gpm hydraulic pump (installed on existing MTS140 GPM pump)	DENISON HYDRAULICS (S#1078844) Serial:NO S/N	YES	Hydraulic Pumps Notes " All hydraulic pumps in M-03,M-13 and M-14 should be combinded into 1 pump room that houses 1 to 3 pumps to supply hydraulic power to the entire lab."	See Comment item ID 154. This item should be merged with Item ID 154. they are the same item	4-8 ft height range	less than 10000 lb.	See Hdy Pump Notes	See Hdy Pump Notes			Mid-bay	High	No	Yes		600V 400A breaker Hydraulic Pump Current TBD depending on number and size of pumps chosen. Likley should plan for 3 circuits of 600V 400A and revise down if					cooling tower water	n/a		n/a	n/a	n/a	n/a	n/a				TBD on replacement Pumps							Y	Y	already part of column S	already part of column T
239	0	NRC-M14-140	3.25 Non Destructive Evaluation	HARDWARE for 7 AXES IMMERSION SCANNER	(BROTHERS) (S#1072114) Serial:TESCAN-002	no			8	50																																				
240	0	NRC-M14-130	3.25 Non Destructive Evaluation	HARDWARE FOR PORTABLE INSPECTION SYSTEM	(BROTHERS) (S#1072114) Serial:TESCAN-001	no			8	50																																				
241	E210	NRC-M14-130	3.25 Non Destructive Evaluation	PARKER POSITIONING SYS. Daedal Division(Post $15K)	POST CAP FOR MIKE (S#) Serial:SR03-1002	YES			8	2500	4x8	4x8	1220 x 2440	1220 x 2440																													N	N	N/A	N/A
242	0	NRC-M14-140	3.25 Non Destructive Evaluation	MAGNETO-OPTIC IMAGING SYSTEM,MOI 308/37 Black Case	QUEST INTEGRATED INC.(MANDACHE (S#1082053) Serial:135 PS 1829	no																																								
243	0	NRC-M14-140	3.25 Non Destructive Evaluation	LASER CONFOCAL DIPLAY HEAD,LT9030M,30mm /w CAMERA (Going Surplus)	KEYENCE CANADA INC.(M.GENEST (S#1073440) Serial:6980022B	no																																								

ID	REVIT Type ID	OLD Space Code (Building & Rm No.)	NEW Space Code	Name	Manufacturer (Make & Model)	Considered for Functional Program	Notes	Notes Other
244	0	NRC-M14-140	3.25 Non Destructive Evaluation	LASER CONFOCAL DISPLAY CONTROLLER,LT-9501SO (Going Surplus)	KEYENCE CANADA INC.(M.GENEST (S#1073440) Serial:E1072136 F 5652	no		
245	0	NRC-M14-103	3.25 Non Destructive Evaluation	SCANGENIE 64-CHANNEL ACTIVE SCAN LAPTOP (sometimes at M3)	ACELLENT TECHNOLOGIES INC(MART (S#1071156) Serial:1014	no		
246	E53	NRC-M3-100E	4.8 Material Testing Equipment Storage	PLATINOUS TEMPERATURE & HUMIDITY CHAMBER	(S#1034880) Serial:19181	YES	needs to be stored . Used for mid bay work 3'X3'x 5' high. Fits in Load frame when required	
247	0	NRC-M14-100B	3.25 Non Destructive Evaluation	SMART COMPOSITE AREA COMPUTED POD M Liao	ACELLENT TECHNOLOGIES INC. (S#1071156) Serial:SHEET?	no		
248	0	NRC-M14-140	3.25 Non Destructive Evaluation	ARMANDA INSPECTION ROBOT	TECSCAN SYSTEMS INC.(BROTHERS) (S#1072114) Serial:	no		
249	0	NRC-M14-103	3.25 Non Destructive Evaluation	SMARTMETAL ULTRASONIC WAVE MODE ANALYSIS M Liao	ACELLENT TECHNOLOGIES INC. (S#1071156) Serial:8835-9726	no		
250	0	NRC-M14-100SHEET	1.1 NRC High Bay	HYDRAULIC WEDGE GRIP SET	(T.BENAK)MTS TESTING SYSTEMS (S#1003151) Serial:12099751B	no	Load Frame accessory kept in storage room	
251	0	NRC-M14-140	3.25 Non Destructive Evaluation	INFRARED CAMERA,HANDHELD THERMOGRAPHIC Oleskiw, Myron - add lens of PR#608209	TECHNO-TEST(GENESTM) (S#1075761) Serial:2637 12	no		
252	0	NRC-M14-140	3.25 Non Destructive Evaluation	HANDHELD THERMOGRAPHIC INFRARED CAMERA in black case	TECHNO-TEST (S#1075761) Serial:	no		
253	0	NRC-M14-140	3.25 Non Destructive Evaluation	PORTABLE VACUUM HOOD AND THERM. SHEAROGRAPHY with BC 3014037	STEINBICHLER VISION SYSTEMS IN (S#1092168) Serial:SE 10 005 1409	no		
254	0	NRC-M14-103A	3.24 Experimental Mechanical Lab	INSENSYS OEM 1030 FIBER SENSOR INTERROGATOR UNIT SHASHANK PANT	INSENSYS AEROSPACE (S#1092687) Serial:99.00001.039902	no		
255	E137	NRC-M14-108B	3.27 Material Testing and Evaluation	TESA MICROHITE 3D MEASURING SYSTEM(<28094) Transfer to AERO - John Rogers is custodian	GAP MACHINERY (S#1043153) Serial:1M084801	YES	backing onto wall is fine	
256	0	NRC-M14-140	3.25 Non Destructive Evaluation	NETWORK ANALYZER Anritsu MS2026C Brothers - Nezih Mrad	ANRITSU ELECTRONICS LTD. (S#1005954) Serial:1110179	no		
257	0	NRC-M14-140	3.25 Non Destructive Evaluation	Micron Optics Fiber Bragg Grating interrogation sy in black case - Dr. Nezih Mrad,46SS-AVRS-P	MICRON OPTICS, Inc (S#1077214) Serial:SIABD6	no		
258	0	NRC-M14-140	3.25 Non Destructive Evaluation	Rohmann Elotest M3 Eddy Current Test Instrument Mike Brothers	ANDEC MFG LTD (S#1079810) Serial:110217	no		
259	0	NRC-M14-140	3.25 Non Destructive Evaluation	AVTECH HIGH VOLTAGE PULSE GENERATOR Nezih Mrad>	Nezih Mrad)AVTECH ELECTROSYS (S#1067210) Serial:12794	no		
260	E136	NRC-M14-108B	3.27 Material Testing and Evaluation	Clark Instrument Digital hardness tester Model CV- Ali Merati,46SC-J021,	Clark (S#) Serial:	YES	backing onto wall is fine	
261	E55	NRC-M14-100	1.1 NRC High Bay	Structural Health Monitoring test Platform Andrew Christie,4 low cap servo valves,36723	Andrew Christie)MTS SYSTEMS (S#1077552) Serial:	YES		
262	0	NRC-M14-140	3.25 Non Destructive Evaluation	Videoscope olympus , $18K Mike Brothers - in black case	OLYMPUS CANADA INC (S#1029096) Serial:Y301040	no		
263	E54	NRC-M14-100	1.1 NRC High Bay	24 channel Full scale test control system Flex 200 andrew Christie $224K	MTS SYSTEMS CORPORATION (S#1077552) Serial:09012143-E	YES	Needs UPS. This unit is portable and does not need designated space in the lab.	
264	0	NRC-M14-100	1.1 NRC High Bay	26 channel Full scale test control system expansio Andrew Christie $50K Upgrade (see 38632-1_	MTS SYSTEMS CORPORATION (S#1077552) Serial:09012143E	no		
265	0	NRC-M14-100	1.1 NRC High Bay	Luna Fiber Optic Strain Measurement System Dr. David Backman	TESTFORCE SYSTEMS INC. (S#1004000) Serial:	no	desk top equipment	
266	E152	NRC-M14-100	1.1 NRC High Bay	26 channel Full scale test control system $237K Andrew Christie FT200	MTS SYSTEMS CORPORATION (S#1077552) Serial:	YES	Needs UPS. This unit is portable and does not need designated space in the lab.	
267	0	NRC-M14-100	1.1 NRC High Bay	64 channel data acquisition sys expansion Upgrade Andrew Christie MTS FlexDac 20	MTS SYSTEMS CORPORATION (S#1077552) Serial:9145383	no	desk top item	
268	0	NRC-M14-100SHEET	1.1 NRC High Bay	6" stroke actuators 65K AERO # 6-08 Sheet A Christie (PO divided by 5x6" & 8x10)	MTS TESTING SYSTEMS (S#1003151) Serial:10429645A	no	equipment stored on shelving until required on a test rig	
269	0	NRC-M14-100SHEET	1.1 NRC High Bay	10" stroke actuators 120K AERO # 10-07 Sheet -A Christie	MTS TESTING SYSTEMS (S#1003151) Serial:10415425F	no	equipment stored on shelving until required on a test rig	
270	0	NRC-M14-100	1.1 NRC High Bay	64 Chanel DAC MTS FlexDAC 20 $40k Andrew Christie A10T-LST-U Black	MTS SYSTEMS CORPORATION (S#1057059) Serial:09027320E	no	desk top item	
271	0	NRC-M14-100	1.1 NRC High Bay	64 Chanel DAC MTS FlexDAC 20 $40k Andrew Christie A10T-LST-U	MTS SYSTEMS CORPORATION (S#1057059) Serial:09025001	no	desk top item	
272	0	NRC-M14-100SHEET	1.1 NRC High Bay	48" MTS Double Ended Actuator $37k Andrew Christie A10T-FST-U	MTS SYSTEMS CORPORATION (S#1057059) Serial:10464904	no	needs to be stored with crane access. Used for high bay work 2'X2'x 9' equipment stored on shelving until required on a test rig	
273	0	NRC-M14-100SHEET	1.1 NRC High Bay	48" MTS Double Ended Actuator $37k Andrew Christie A10T-FST-U	MTS SYSTEMS CORPORATION (S#1057059) Serial:10464589	no	needs to be stored with crane access. Used for high bay work 2'X2'x 9' equipment stored on shelving until required on a test rig	
274	0	NRC-M14-100SHEET	1.1 NRC High Bay	12" stroke 5.5 Kip actuators (1 of 6) >txt Andrew Christie>$18K>A10T-FST-U (old 39048)	MTS Systems (S#1077552) Serial:10463741A	no	equipment stored on shelving until required on a test rig	
275	0	NRC-M14-100SHEET	1.1 NRC High Bay	12" stroke 5.5 Kip actuators (2 of 6) Andrew Christie>$18K>A10T-FST-U (old 39049)	MTS Systems (S#1077552) Serial:10463741B	no	equipment stored on shelving until required on a test rig	
276	0	NRC-M14-100SHEET	1.1 NRC High Bay	12" stroke 5.5 Kip actuators (3 of 6) Andrew Christie>$18K>A10T-FST-U old 39050	MTS Systems (S#1077552) Serial:10463741C	no	equipment stored on shelving until required on a test rig	
277	0	NRC-M14-100SHEET	1.1 NRC High Bay	12" stroke 5.5 Kip actuators (4 of 6) Andrew Christie>$18K>A10T-FST-U old 39051	MTS Systems (S#1077552) Serial:10462926A	no	equipment stored on shelving until required on a test rig	
278	0	NRC-M14-100SHEET	1.1 NRC High Bay	12" stroke 5.5 Kip actuators (5 of 6) Andrew Christie>$18K>A10T-FST-U old 39052	MTS Systems (S#1077552) Serial:10462926B	no	equipment stored on shelving until required on a test rig	
279	0	NRC-M14-100SHEET	1.1 NRC High Bay	12" stroke 5.5 Kip actuators (6 of 6) Andrew Christie>$18K>A10T-FST-U old 39053	MTS Systems (S#1077552) Serial:10462926C	no	equipment stored on shelving until required on a test rig	
280	0	NRC-M14-140	3.25 Non Destructive Evaluation	ELOTEST M3-D Set Luc Lafleur $14K	Rick Kearsey, Luc Lafleur (S#1002921) Serial:AOOMCX	no		
281	E206	NRC-M14-130	3.25 Non Destructive Evaluation	CRXVision Computed Radiography Scanner AERO - Mike Brothers / Min Liao	NON-DESTRUCTIVE TESTING (S#1054945) Serial:	YES	chnaged to YES	equipment sits on top of benches, one of the 6 ID 597
282	0	NRC-M14-100	1.1 NRC High Bay	3@ MTS 244 actuators (2 16" 1 14") Andy Christie $120k	MTS (S#1077552) Serial:	no	equipment stored on shelving until required on a test rig	
283	0	NRC-M14-100	1.1 NRC High Bay	64 channel data acquisition systems MTS FlexDac 20 Andrew Christie - 35K	(S#1003151) Serial:9080829	no	equipment stored on shelving until required on a test rig	
284	E56	NRC-M14-100A	3.23 Material and Component Testing	X-Ray Diffraction Residual Stress Msmt Equipment David Backman $200k all one unit	Min Liao/D Backman (S#1031200) Serial:	YES		
285	0	NRC-M14-100SHEET	1.1 NRC High Bay	6" stroke actuators 65K AERO # 6-06 Sheet A Christie	MTS TESTING SYSTEMS (S#1003151) Serial:10429645C	no	equipment stored on shelving until required on a test rig	
286	0	NRC-M14-100SHEET	1.1 NRC High Bay	6" stroke actuators 65K AERO # 6-05 Sheet A Christie	MTS TESTING SYSTEMS (S#1003151) Serial:10429645D	no	equipment stored on shelving until required on a test rig	
287	0	NRC-M14-100SHEET	1.1 NRC High Bay	6" stroke actuators 65K AERO # 6-10 Sheet A Christie	MTS TESTING SYSTEMS (S#1003151) Serial:10429645E	no	equipment stored on shelving until required on a test rig	
288	0	NRC-M14-100SHEET	1.1 NRC High Bay	6" stroke actuators 65K AERO # 6-09 Sheet A Christie	MTS TESTING SYSTEMS (S#1003151) Serial:10429645B	no	equipment stored on shelving until required on a test rig	
289	0	NRC-M14-100SHEET	1.1 NRC High Bay	10" stroke actuators 120K AERO # 10-08 Sheet -A Christie	MTS TESTING SYSTEMS (S#1003151) Serial:10415425C	no	equipment stored on shelving until required on a test rig	
290	0	NRC-M14-100SHEET	1.1 NRC High Bay	10" stroke actuators 120K AERO # 10-12 Sheet -A Christie	MTS TESTING SYSTEMS (S#1003151) Serial:10415425E	no	equipment stored on shelving until required on a test rig	
291	0	NRC-M14-100SHEET	1.1 NRC High Bay	10" stroke actuators 120K AERO # 10-09 Sheet -A Christie	MTS TESTING SYSTEMS (S#1003151) Serial:10415425D	no	equipment stored on shelving until required on a test rig	
292	0	NRC-M14-100SHEET	1.1 NRC High Bay	10" stroke actuators 120K AERO # 10-10 Sheet -A Christie	MTS TESTING SYSTEMS (S#1003151) Serial:10415425A	no	equipment stored on shelving until required on a test rig	
293	0	NRC-M14-100SHEET	1.1 NRC High Bay	10" stroke actuators 120K AERO # 10-06 Sheet -A Christie	MTS TESTING SYSTEMS (S#1003151) Serial:10415425H	no	equipment stored on shelving until required on a test rig	
294	0	NRC-M14-100SHEET	1.1 NRC High Bay	10" stroke actuators 120K AERO # 10-13 Sheet -A Christie	MTS TESTING SYSTEMS (S#1003151) Serial:10436614	no	equipment stored on shelving until required on a test rig	
295	0	NRC-M14-100SHEET	1.1 NRC High Bay	10" stroke actuators 120K AERO # 10-11 Sheet -A Christie	MTS TESTING SYSTEMS (S#1003151) Serial:10415425B	no	equipment stored on shelving until required on a test rig	
296	0	NRC-M14-140	3.25 Non Destructive Evaluation	EDDY CURRENT TEST INSTRUMENT MIZ-27 ET Blue Box see 22259-2	QUALITY NDE LTD. (S#1006464) Serial:245	no		
297	0	NRC-M14-140	3.25 Non Destructive Evaluation	Woodpecker WP632AM Marc Genest $16k	(S#1114220) Serial:	no		
298	0	NRC-M14-116	3.25 Non Destructive Evaluation	Lorad LPX-160 X-Ray Unit Marc Genest $29k	(S#1114953) Serial:	no		
299	0	NRC-M14-100	1.1 NRC High Bay	2 of 3 @ MTS 244 actuators (1 16") Andy Christie $120k	MTS SYSTEMS CORPORATION (S#1077552) Serial:	no	equipment stored on shelving until required on a test rig	
300	0	NRC-M14-100	1.1 NRC High Bay	3 of 3 @ MTS 244 actuators (1 14") Andy Christie $120k	MTS SYSTEMS CORPORATION (S#1077552) Serial:	no	equipment stored on shelving until required on a test rig	
301	E57	NRC-M14-100	1.1 NRC High Bay	MTS Flex Dac FT200 Control System Andrew Christie po 3118473401	MTS (S#) Serial:9097198	YES	Needs UPS	
302	0	NRC-M14-150	3.25 Non Destructive Evaluation	OmniScan MX2 2nd Generation Phase array Acquisitio Trent Gillis - $76k	(S#) Serial:	no		
303	E176	NRC-M14-108E	3.13 Burner Rig Control Room	3D Automated Laser Scanner Clinton Carnegie $67k burner Rig 2 Ctrl Rm	Scott Yandt (S#1051253) Serial:	YES	Requires work bench to accommodate equipment and computer to operate.	
304	0	NRC-M14-100	1.1 NRC High Bay	Interface Dual Channel Load Cell Calibration Sys Stephane Cloutier Model: 9840-200-1-T	Interface - BHD Inst (S#1081541) Serial:88390	no	portable desk top sysem	
305	0	NRC-M14-130	3.25 Non Destructive Evaluation	Bondmaster 600 bond testing flaw detector Trent Gillis $13k	Marc Genest (S#1000912) Serial:	no		
306	0	NRC-M14-130	3.25 Non Destructive Evaluation	Infrared Camera / IR TCM HD 1024 Trent Gillis $53k	Marc Genest (S#) Serial:	no		
~~307~~	~~0~~	~~NRC-M17-127~~	~~Not Assigned (Not Included in Scope)~~	~~REMOVED - PINNACLE PLUS+ 5K DC MAGNETRON, GENERATORS, PLASMA~~	~~ADVANCED ENERGY INDUSTRIES INC (S#1000003) Serial:280449~~	~~no~~		
~~308~~	~~0~~	~~NRC-M17-127~~	~~Not Assigned (Not Included in Scope)~~	~~REMOVED - PINNACLE PLUS+ 5K DC MAGNETRON, GENERATORS, PLASMA~~	~~ADVANCED ENERGY INDUSTRIES INC (S#1000003) Serial:280450~~	~~no~~		
~~309~~	~~0~~	~~NRC-M17-127~~	~~Not Assigned (Not Included in Scope)~~	~~REMOVED - GENERATORS, PLASMA old bc 237102~~	~~ADVANCED ENERGY INDUSTRIES INC (S#1000003) Serial:280450~~	~~no~~		
~~310~~	~~0~~	~~NRC-M17-127~~	~~Not Assigned (Not Included in Scope)~~	~~REMOVED - Magnetron Sputtering System MAGSPUT-2G2-AUTO Vladimir Pankov transfered to AERO~~	~~Torr INt Inc (S#1058450) Serial:MAGSPUT 2003/102~~	~~no~~		
311	E58	NRC-M17-HBAY	3.17 Heat Treatment and Coating Lab	CYCLIC OXIDATION FURNACE MODEL RAPID TEMP,1610BL(C ROBERT MCKELLAR	(MORPHY)CM FURNACES INC. (S#1014888) Serial:90788-2	YES	Requires heat/fumes extraction hood.	off gassing material 250V 60A.Why are 311 and 312 assigned the same equipment number, E58.
312	E58	NRC-M17-HBAY	3.17 Heat Treatment and Coating Lab	CYCLIC OXIDATION FURNACE MODEL RAPID TEMP,1610BL(C	(MORPHY)CM FURNACES INC. (S#1014888) Serial:90788-1	YES	Requires heat/fumes extraction hood.	off gassing material 250V 60A .Why are 311 and 312 assigned the same equipment number, E58.

ID	Equipment height (ft)	Equipment weight (lbs)	Foot Print WxL (ft)	Ideal Area Required WxL (ft)	Footprint Metric WxL (metric)	Ideal Area Required WxL (metric)	Ideal Room Height	Power Requirement (Req' more than 120V)	Fuel Consumed	Process Cooling Required	Back-up Power Required	Primary Power	Secondary Power	Tertiary Power	Quaternary Power	Additional Power	Process Cooling	City Water Backup	Compressed Air	City Water Supply	Effluent Plumbing Requirements	Compressed Gases	Natural Gas used?	Flammable Compressed Gases	Special Ventilation	Operating temperatures (deg Celsius)	Sensitive to vibrations?	Noisy equipment?	Lifing Aids	Primary Work Surface	Secondary Work Surface	Equipment Rack	Storage Type	Additional Spec Sheet Available	Network Connection (Y/N)	External Dedicated Equipment (Y/N)	External Dedicated Equipment Dimensions (W x L x H inches)	External Dedicated Equipment Clearance (inches)
244																																						
245																																						
246	4-8 ft height range	less than 500 lb.	3'X3'	fits in test frame	915 x 915		Mid-bay		No	No	No							n/a		n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
247																																						
248																																						
249																																						
250	n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
251																																						
252																																						
253																																						
254																																						
255	4-8 ft height range	less than 1000 lb.	4X6	8x10	1220 x 1830	2440 x 3050	office height or Mid Bay	110V	No	No	No	110V						n/a		n/a	n/a	n/a	n/a	n/a				n/a						Yes	N	N	N/A	N/A
256																																						
257																																						
258																																						
259	8	5																																				
260	4-8 ft height range	less than 1000 lb.	4X6	8x10	1220 x 1830	2440 x 3050	office height or Mid Bay	110V	No	No	No	110V						n/a		n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
261	4-8 ft height range	less than 10000 lb.	8X18	16X24	2440 x 5485	4875 x 7315	Mid or High Bay	110V	No	No	No	110V						n/a		n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
262																																					N/A	N/A
263	4-8 ft height range	less than 1000 lb.	4X4	10X10	1220 x 1220	3050 x 3050	High-bay	Normal	No	No	n/a	110V 20A						n/a		n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
264	n/a - see notes	n/a	Part of 263	Part of 263			n/a	n/a	n/a	n/a	n/a							n/a		n/a	n/a	n/a	n/a	n/a				n/a										
265	n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	110V						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
266	4-8 ft height range	less than 1000 lb.	4X4	10X10	1220 x 1220	3050 x 3050	High-bay	Normal	No	No	n/a							n/a		n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
267	n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a							n/a		n/a	n/a	n/a	n/a	n/a				n/a										
268	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
269	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
270	n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	110V						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
271	n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	110V						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
272	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
273	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
274	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
275	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
276	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
277	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
278	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
279	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
280																																						
281	N/A		4x8	6x12	1220 x 2440	1830 x 3660																													Y	Y	already part of column S	already part of column T
282	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
283	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	110V						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
284	4-8 ft height range	less than 500 lb.	4X10	12X14	1220 x 3050	3660 x 4270	Mid-bay	Normal	No	No	No	110V						n/a		n/a	n/a	n/a	n/a	n/a			yes	n/a							Y	Y	already part of column S	already part of column T
285	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
286	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
287	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
288	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
289	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
290	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
291	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
292	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
293	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
294	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
295	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
296																																						
297																																						
298																																						
299	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
300	n/a - see notes	less than 500 lb.	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
301	4-8 ft height range	less than 500 lb.	4X4	10X10	1220 x 1220	3050 x 3050	High-bay	Normal	No	No	No	110V 20A						n/a		n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
302																																						
303	3	150	2x3	3X5	610 x 915	915 x 1525						110 VAC																							Y	Y	already part of column S	already part of column T
304	n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a						n/a		n/a	n/a	n/a	n/a	n/a				n/a										
305																																						
306																																						
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311	6	500	4x5	10 x 6	1220 x 1525	3050 x 1830	Normal	High	No		No	220 VAC, 60A					None	No	No	No	None	None		None	Extraction Hood Heat/Fumes					Standard 72" Bench					N	N	N/A	N/A
312	6	500	4x5	10 x 6	1220 x 1525	3050 x 1830	Normal	High	No		No	220 VAC, 60A					None	No	No	No	None	None		None	Extraction Hood Heat/Fumes					Standard 72" Bench					N	N	N/A	N/A

ID	REVIT Type ID	OLD Space Code (Building & Rm No.)	NEW Space Code	Name	Manufacturer (Make & Model)	Considered for Functional Program	Notes	Notes Other	Equipment height (ft)	Equipment weight (lbs)	Foot Print WxL (ft)	Ideal Area Required WxL (ft)	Footprint Metric WxL (metric)	Ideal Area Required WxL (metric)	Ideal Room Height	Power Requirement (Req' more than 120V)	Fuel Consumed	Process Cooling Required	Back-up Power Required	Primary Power	Secondary Power	Tertiary Power	Quartenary Power	Additional Power	Process Cooling	City Water Backup	Compressed Air	City Water Supply	Effluent Plumbing Requirements	Compressed Gases	Natural Gas used?	Flammable Compressed Gases	Special Ventilation	Operating temperatures (deg Celsius)	Sensitive to vibrations?	Noisy equipment?	Lifing Aids	Primary Work Surface	Secondary Work Surface	Equipment Rack	Storage Type	Additional Spec Sheet Available	Network Connection (Y/N)	External Dedicated Equipment (Y/N)	External Dedicated Equipment Dimensions (W x L x H inches)	External Dedicated Equipment Clearance (inches)
313	E59	NRC-M17-HIGHBAY	3.17 Heat Treatment and Coating Lab	High Temp. Box Furnace-Carbolite RHF 1400 Clinton Carnefie $15k	Carbolite -OPTI-TECH SCIENTIFI (S#1016345) Serial:21-701324	YES	Requires heat/fumes extraction hood.	off gassing material 250V 60A. Requires work surface that won't be damaged by high temperatures and has single shelf underneath for the furnace control system.	3	250	3x3	6 x 6	915 x 915	1830 x 1830	Normal	High	No		No	220 VAC, 60A					None	No	No	No	None	None		None	Extraction Hood Heat/Fumes					Standard 72" Bench				Yes	N	N	N/A	N/A
314	E125	NRC-M17-100	3.17 Heat Treatment and Coating Lab	Cyclic Oxidization Furnace Ryan MacNeil $27k A10S-Proc-U	R Kearsey (S#1014888) Serial:170691	YES		off gassing material 250V 60A			10 x 6	10 x 6	3050 x 1830	3050 x 1830	Normal	High	No		No	Other (Specify)					None	No	No	No	None	None		None	Extraction Hood Heat/Fumes					Standard 72" Bench					N	N	N/A	N/A
315	0	NRC-M3-100	3.23 Material and Component Testing	EXTENSOMETER BIAXIAL, MTS C/W CABLE & CONDITIONER. in cabinet	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:216	no	Part of ID 326		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										
~~316~~	~~0~~	~~NRC-M3-100~~	~~3.23 Material and Component Testing~~	~~TESTING MACHINE ,INSTRON 10,000 KG CAPACITY GOING SURPLUS (Aug 2019)~~	~~(S#1017825) Serial:6286~~	~~no~~	~~remove from list. /Surplus~~																																							
~~317~~	~~0~~	~~NRC-M3-100~~	~~3.23 Material and Component Testing~~	~~MTS ReNew control system quote2014-12895 Andrew Christie>$22K see 30272-1 Going Surplus~~	~~MTS TESTING SYSTEMS (CANADA) L (S#1003151) Serial:~~	~~no~~	~~remove from list. /Surplus~~																																							
318	E60	NRC-M3-100	3.23 Material and Component Testing	LOAD FRAME#1 4 COLUMN, 55 KIP & 2 SETS OF 601.11A-	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:455	YES	Needs Hydraulic Supply and existing UPS Needs 208 3 phase and 600V power available close by for environmental test chambers Load Frame # 1		4-8 ft height range	under 2000 lb.	11X3	15X9	3355 x 915	4575 x 2745	Mid-bay	Normal	No	No	No	Hydraulic	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
319	0	NRC-M3-100	3.23 Material and Component Testing	Test Frame control system $49K Andrew Christie>in-service the same day<Christie	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:455	no	This is a test frame component and sits on the work station		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										
320	E162	NRC-M3-110	3.23 Material and Component Testing	LOAD FRAME#2 4 COLUMN,53 KIPS,C/W SERVICE MANIFOLD	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:456	YES	Needs Hydraulic Supply and existing UPS Needs 208 3 phase and 600V power available close by for environmental test chambers. Load Frame # 2		4-8 ft height range	under 10000 lb.	11X3	15X9	3355 x 915	4575 x 2745	Mid-bay	Normal	No	No	No	Hydraulic	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
321	E52	NRC-M3-B1	4.2 Pump Room	POWER SUPPLY, HYDRAULIC MTS,MODEL: 510,23	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:118	YES	Hydraulic Pumps Notes " All hydraulic pumps in M-03,M-13 and M-14 should be combinded into 1 pump room that houses 1 or2 pumps to supply hydraulic power to the entire lab."	See comment item ID 154	4-8 ft height range	under 2000 lb.	See Hdy Pump Notes	See Hdy Pump Notes				High	No	Yes	No	600V 400A breaker Hydraulic Pump Current TBD depending on number and size of pumps chosen. Likley should plan for	n/a	n/a	n/a	n/a	cooling tower water	n/a	n/a	n/a	n/a	n/a	n/a	n/a				TBD on replacement Pumps							Y	Y	already part of column S	already part of column T
322	E64	NRC-M3-100	3.23 Material and Component Testing	IMPACT SYSTEM TEST DATA,C/W SOFTWARE,MODEL:730-1XT with bc 3005805	(S#1017825) Serial:	YES	Consider together with ID 361		8-12 ft height range	under 1000 lb.	See 361	N/A			Mid-bay	Normal	No	No		110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
323	E64	NRC-M3-100	3.23 Material and Component Testing	IMPACT SYSTEM TEST DATA,C/W SOFTWARE,MODEL:730-1XT with bc 3005805	(S#1000469) Serial:	YES	Consider together with ID 361		n/a - see notes	n/a	See 361	See 361			See 361	Normal	No	No		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
324	0	NRC-M3-B1B	4.8 Material Testing Equipment Storage	GRIP,HYDRAULIC WEDGE ACTION 110,000 LB. MTS,641.37 note 3005780 IN B1 deactivated in SAP	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:448	no	Load Frame accessory kept in storage room		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										
325	E61	NRC-M3-100	3.23 Material and Component Testing	MECHANICAL SYSTEM FOR MTS 880 SYSTEM	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:	YES	Needs Hydraulic Supply and existing UPS Needs 208 3 phase and 600V power available close by for environmental test chambers Load Frame # 6		8-12 ft height range	under 5000 lb	11X3	15x9	3355 x 915	4575 x 2745	Mid-bay	Normal	No	No	No	Hydraulic	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
326	E163	NRC-M3-100	3.23 Material and Component Testing	LOAD FRAME,BI-AXIAL MTS 55 KIP,UPGRADE OF PLANAR	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:	YES	Needs Hydraulic Supply and existing UPS Needs 208 3 phase and 600V power available for High Temperature Testing. Consider together with ID 326,327 and 328 and 375. Load Frame # 5		12-16 ft height range	under 10000 lb	11X3	15x9	3355 x 915	4575 x 2745	Mid-bay	High	No	No		Hydraulic	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
327	0	NRC-M3-100	3.23 Material and Component Testing	Upgrade and refurbishment of 55 kip Bi-Axial test A Christie>$190K	Min Liao (S#1003151) Serial:	no	Consider together with ID 326		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	merge 326/327/328	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										
328	0	NRC-M3-100	3.23 Material and Component Testing	MTS Wedge grips Bi-Axial load frame 55 kip Richard Desnoyers (A10T-MTS-U) BC 3030007 >txt	MTS TESTING SYS. CANADA LTD (S#1003151) Serial:N/A	no	Consider together with ID 326		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	merge 326/327/328	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										
329	E126	NRC-M3-100A	3.20 Microscope Lab	MICROSCOPE,STEREOZOOM,OLYMPUS C/W 35 MM. CAMERA	Olympys CO (S#3005841) Serial:904009	YES					4x4	6x9	1220 x 1220	1830 x 2745	Normal	Normal	No	No	No																								Y	Y	already part of column S	already part of column T
330	E52	NRC-M3-B1	4.2 Pump Room	POWER SUPPLY, HYDRAULIC, WITH FLOW CAPACITY OF 70	MTS TESTING SYS. CANADA LTD (S#1017825) Serial:	YES	Hydraulic Pumps Notes " All hydraulic pumps in M-03,M-13 and M-14 should be combinded into 1 pump room that houses 1 or2 pumps to supply hydraulic power to the entire lab."	See Item ID 154	12-16 ft height range	5700lb	See Hdy Pump Notes	See Hdy Pump Notes				High	No	Yes	No	175A Running						n/a		n/a	n/a	n/a	n/a	n/a				TBD on replacement Pumps							Y	Y	already part of column S	already part of column T
331	E131	NRC-M3-BSMT1	4.8 Material Testing Equipment Storage	ENVIRONMENTAL CHAMBER,-150 DEGREES TO +250°c,TEE 6	BRABENDER REALTEST GMBH (S#1017825) Serial:921	no	needs to be stored . Used for mid bay work 3'X3'x 4' high		n/a - see notes	n/a	see note	n/a	915 x 915		n/a	n/a	n/a	n/a	n/a	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										
332	0	NRC-M3-100B	3.24 Experimental Mechanical Lab	CAMERA,10 BIT HIGH RES. CCD,HAMAMATSU,M#:C4742 gone surplus	CORECO INCORPORATED (S#1017825) Serial:820005	no																																								
~~333~~	~~0~~	~~NRC-M3-100E~~	~~4.8 Material Testing Equipment Storage~~	~~LATHE W/ATTACHMENTS STD MODERN,MODEL: 1334~~	~~(S#1017825) Serial:9098~~	~~no~~	~~Not Moving~~	~~n/a~~	~~n/a - see notes~~	~~n/a~~	~~n/a~~	~~n/a~~			~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~				
~~334~~	~~0~~	~~NRC-M3-MEZZ~~	~~Not Assigned (Not Included in Scope)~~	~~ORIEL MOTORIZED ROTATOR X-4, 360° ROTATOR Should go to surplus~~	~~GAMBLE TECHNOLOGIES LIMITED (S#1003135) Serial:~~	~~no~~																																								
335	E164	NRC-M3-100	3.23 Material and Component Testing	BENCH TOP LOAD FRAME SYSTEM,MTS m#:359 MINI TEST	MTS SYSTEMS CORP (S#1000491) Serial:1301867	YES	Load Frame # 10		4-8 ft height range	under 500 lb	11X3	15x9	3355 x 915	4575 x 2745	Mid-bay	Normal	No	No	No	Hydraulic	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
336	E52	NRC-M3-BASEMENT	4.2 Pump Room	HYDRAULIC SYSTEM, 23GPM,SOLID HYD LINES, MANIFOLD A Christie - old bc 236476 - main bay basement	GS-HYDRO (S#) Serial:	YES	Hydraulic Pumps Notes " All hydraulic pumps in M-03,M-13 and M-14 should be combinded into 1 pump room that houses 1 or2 pumps to supply hydraulic power to the entire lab."	See comment Item ID 154	4-8 ft height range	1700lb	See Hdy Pump Notes	See Hdy Pump Notes				High	No	Yes	No	600V 400A breaker Hydraulic Pump Current TBD depending on number and size of pumps chosen. Likley should plan for						n/a		n/a	n/a	n/a	n/a	n/a				TBD on replacement Pumps							Y	Y	already part of column S	already part of column T
337	0	NRC-M3-BASEMENT	4.2 Pump Room	HYDRAULIC SYSTEM, 23GPM UPGRADE AT M-3 A Christie - old bc 236476 - main bay basement	GS-HYDRO (S#1053473) Serial:	no																				n/a		n/a	n/a							TBD on replacement Pumps										
338	0	NRC-M3-100	3.23 Material and Component Testing	EXTENSOMETER,Cytec model KGR-1 (wood box)	(S#1010677) Serial:MC2H	no	Load Frame accessory kept in storage room		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a							n/a		n/a	n/a	n/a	n/a	n/a														
339	0	NRC-M3-100	3.23 Material and Component Testing	DISPLACEMENT GAGE MODEL 632.06H-33 in black case	MTS TESTING SYSTEMS (S#1003151) Serial:1374900	no	Load Frame accessory kept in storage room		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										
340	0	NRC-M3-100C	3.27 Material Testing and Evaluation	SENSICAM QE B/W SUPER VGA HIGH SPEED CAMERA	OPTIKON CORPORATION (S#1042279) Serial:670KS2765	no																																								
341	0	NRC-M3-B1	4.2 Pump Room	REBUILT HYDRAULIC PUMP from Norman Equipment	NORMAN EQUIPMENT COMPANY (S#1059767) Serial:7772870	no																				n/a		n/a	n/a							n/a										
~~342~~	~~0~~	~~NRC-M3-100~~	~~3.23 Material and Component Testing~~	~~LINEAR MOTOR PGL160 STAGE To go for Surplus~~	~~(S#1064219) Serial:2834~~	~~no~~																				~~n/a~~		~~n/a~~	~~n/a~~																	
343	0	NRC-M3-100B	3.24 Experimental Mechanical Lab	8-CHANNEL AC MONITORING SYSTEM,100 Hz TO 250 KHz	(S#1068500) Serial:N/A	no																																								
344	E62	NRC-M3-100	3.23 Material and Component Testing	22 KIP (100KN) TESTING SYSTEM other BC 3018343	MTS SYSTEMS CORPORATION (S#1009137) Serial:101663158	YES	Needs Hydraulic Supply and existing UPS Needs 208 3 phase and 600V power available close by for environmental test chambers Load Frame #7		8-12 ft height range	under 5000 lb	11X3	15x9	3355 x 915	4575 x 2745	Mid-bay	Normal	No	No	No	Hydraulic	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
345	E157	NRC-M3-100	3.23 Material and Component Testing	100,000 LB LOAD CELL FRAME #8 model:312.41 J Rogers	VACS LTD. (S#1008672) Serial:439	YES	Load Frame # 8. Includes Loadcell and frame		8-12 ft height range	under 5000 lb	11X3	15x9	3355 x 915	4575 x 2745	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
346	0	NRC-M3-100	3.23 Material and Component Testing	CATMAN E-PACK,HBM DATA AQUISITION SYSTEM,BL12A	(S#1060171) Serial:T6003C	no	Load Frame accessory kept in storage room		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										
347	0	NRC-M3-100	3.23 Material and Component Testing	HYDRAULIC WEDGE GRIP SET	MTS SYSTEMS (S#1000491) Serial:	no	Load Frame accessory kept in storage room		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										
348	E132	NRC-M3-BSMT1	4.8 Material Testing Equipment Storage	3710 TEST OVEN - MTS	(S#1000491) Serial:06-0514	YES	needs to be stored . Used for mid bay work 5'X4'x 4' high				5X4	5x4	1525 x 1220			High	No	No	No	50A 208 single phase Breaker						n/a		n/a	n/a							n/a							N	N	N/A	N/A
349	0	NRC-M3-100D	3.27 Material Testing and Evaluation	resistance welder INVERTER,HIGH FREQUENCY RESISTANCE WELDING SYS.	(S#1058766) Serial:5100191	no																																								
~~350~~	~~0~~	~~NRC-M3-MEZZ~~	~~Not Assigned (Not Included in Scope)~~	~~*CG* DELTA THERM 1410 SYSTEM-c-goods-H1410 going surplus software marcus bordage dave~~	~~STRESS PHOTONICS (S#1022628) Serial:2024-1104~~	~~no~~																																								
~~351~~	~~0~~	~~NRC-M3-100~~	~~3.23 Material and Component Testing~~	~~HEAT FLOW METERS, THASYS & THISYS GUARDED Simon Hind> Grey Box - Belongs to AMTG~~	~~HUKSEFLUX THERMAL (S#1078129) Serial:THISYS06611~~	~~no~~																				~~n/a~~		~~n/a~~	~~n/a~~																	
352	0	NRC-M3-B1	4.2 Pump Room	70 GPM Pump (post cap $50,000)same as bc3005775	POST CAP FOR Harrison, Matthie (S#) Serial:	no																				n/a		n/a	n/a																	
353	0	NRC-M3-100	3.23 Material and Component Testing	MTS FLEXTEST CONTROLLER - model:494-04 under desk east side	MTS SYSTEMS CORPORATION (S#1009137) Serial:2035542D	no	This is a test frame component and sits on the work station		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										
354	0	NRC-M3-100C	3.27 Material Testing and Evaluation	MICROSCOPE,TWO POSITION ZOOM LENS -IR112-Z1100	BACKMAND (S#1022628) Serial:1008-0108	no																																								
355	0	NRC-M3-100	3.23 Material and Component Testing	LABORATORY DATA AQUISITION AND CONTROL SYSTEM	(T.BENAK)FRACTURE TECHNOLOGY A (S#1055140) Serial:4405/B84G29	no	Load Frame accessory kept in storage room		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										
356	0	NRC-M3-100	3.23 Material and Component Testing	FLEXTEST40 CONTROLLER,model:494.04	(BENAKT)MTS SYSTEMS (S#1077552) Serial:02070062D	no	This is a test frame component and sits on the work station		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										
357	E63	NRC-M3-100	3.23 Material and Component Testing	UNIVERSAL TESTING MACHINE for $37K, A Christie	MTS TESTING SYS (S#1003151) Serial:10337532	YES	Needs UPS Load Frame# 11		4-8 ft height range	under 500 lb	6x3	6X7	1830 x 915	1830 x 2135	Mid-bay	Normal	No	No	No	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
358	0	NRC-M3-100B	3.24 Experimental Mechanical Lab	Photron SA3 cameras (QTY 2) for strain imaging sys Dave Backman>$23,875 each> old 3017839	Dave Backman,DURHAM INSTRUME (S#1000158) Serial:9E5003E5A	no																																								
359	0	NRC-M3-100B	3.24 Experimental Mechanical Lab	Photron SA3 cameras (QTY 2) for strain imaging sys Dave Backman>$23,875 each> old 3017840	Dave Backman,DURHAM INSTRUME (S#1000158) Serial:9E5003E57	no																																								
360	0	NRC-M3-100	3.23 Material and Component Testing	DCPDPOWERSUPPLY reversDC potential drop systPD520A aero-tom benak $13150 {replaces 8-2863}Seriel #	Tom Benak,FRACTURE TECHN (S#1055140) Serial:1209A00859	no	Load Frame accessory kept in storage room		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										
361	E64	NRC-M3-100	3.23 Material and Component Testing	Environmental chamber for drop tower & sensor $53k Andrew Christie> new bc?	Andrew Christie (S#1073877) Serial:	YES	Consider together with ID 322 and 323		4 ft	under 500 lb	6x3	6X6	1830 x 915	1830 x 1830	Mid-bay	120V 20A	No	No		120V 20A	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
362	E207	NRC-M3-100	3.23 Material and Component Testing	Temperature / Moisture Conditioning Chambre$16,782 Andrew Christie,>incorrect bc3018022	NICHOLAS BELLINGER,JOHNSTON (S#) Serial:N/A	YES	TBD		4-8 ft height range	under 1000	4x4	8x8	1220 x 1220	2440 x 2440	Mid-bay		No	No		TBD 120V 20A circuit	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
363	0	NRC-M3-100B	3.24 Experimental Mechanical Lab	Photron SA-X Camera 2,324K-M2>AMR 38129 David Backman,i see 37617-repeat	HIGH SPEED IMAGING INC. (S#1039066) Serial:10031708053	no																																								
364	0	NRC-M3-100B	3.24 Experimental Mechanical Lab	Photron SA-X Camera 1>AMR 38127 David Backman	HIGH SPEED IMAGING INC. (S#1039066) Serial:10031708054	no																																								
365	0	NRC-M3-100B	3.24 Experimental Mechanical Lab	Thermoelastic stress analysis system with FLIR David Backman, FLIR Camera in case	(David Backman) FLIR (S#1022628) Serial:TAG ON COMPUTER	no																																								
366	0	NRC-M3-100B	3.24 Experimental Mechanical Lab	ECO Jab Bullet High Speed LED Light (x2 units) David Backman 2nd sn: 03513J050	HIGH SPEED IMAGING INC. (S#1039066) Serial:33512J003	no																																								
367	0	NRC-M3-100	3.23 Material and Component Testing	50 kip hydraulic wedge grips and Controller Andrew Christie> mod:685.10E.05 >txt	(Min Liao) MTS (S#1003151) Serial:10424766	no	This is a test frame component and sits on the work station		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										
368	E65	NRC-M3-100	3.23 Material and Component Testing	MTS Acmen 3 Electrodynamic tLoad Frame $96K Andrew Christie>Model: 807.003	Drazen Djokic (S#1003151) Serial:10406151	YES	Needs UPS Load Frame #12				6x3	6X7	1830 x 915	1830 x 2135	Mid-bay	Normal	No	No	No	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
369	0	NRC-M3-100C	3.27 Material Testing and Evaluation	Optical extensometer system $21K Dr. Backman -Min Liao - sheet	HIGH SPEED IMAGING INC. (S#1039066) Serial:	no																																								
370	E66	NRC-M3-100	3.23 Material and Component Testing	MTS Landmark Servohydraulic Test System 5.5 Kip Capacity Load Frame A Christie $109K	MTS TESTING SYSTEMS (S#1003151) Serial:10486302	YES	Needs Hydraulic Supply and existing UPS Needs 208 3 phase and 600V power available close by for environmental test chambers. Loadframe # 4		4-8 ft height range	under 2000 lb.	11X3	15x9	3355 x 915	4575 x 2745	Mid-bay	Normal	No	No	No	Hydraulic	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
371	0	NRC-M3-100	3.23 Material and Component Testing	MTS Alignment system quote 2015-23796 Andrew Christie $15K Min Liao	MTS TESTING SYSTEMS (CANADA) L (S#1003151) Serial:	no	Load Frame accessory kept in storage room		n/a - see notes	n/a	n/a	n/a			n/a	n/a	n/a	n/a	n/a	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										

ID	REVIT Type ID	OLD Space Code (Building & Rm No.)	NEW Space Code	Name	Manufacturer (Make & Model)	Considered for Functional Program	Notes	Notes Other	Equipment height (ft)	Equipment weight (lbs)
372	E67	NRC-M3-100	3.23 Material and Component Testing	High Strain Rate Load Frame $810K, 9/9 AUC 8-3016 Nicholas Ignatieff,IMC121,	A.Johnston M.Dumoulin (S#) Serial:	YES	Needs Hydraulic Supply and existing UPS Needs 208 3 phase and 600V power available for High Temperature Testing Requires extra floor reinforcement for impact. Load frame # 13		12 to 16 ft range	less than 5000 lb.
373	0	NRC-M3-BSMT1	4.8 Material Testing Equipment Storage	All temperature hydraulic grip make separate asset (old amr 13598)	MTS SYSTEMS CORPORATION (S#1077552) Serial:233520	no				
374	0	NRC-M3-PUMPROOM	4.2 Pump Room	M3 pump room chiller Andrew Christie $20K	Min Liao (S#1064447) Serial:339901-10-1	no	should be replaced with new building HVAC or new system. Used to cool pump room air temp.	See comment Item ID154	4 to 8 foot range	less than 1000 lb.
375	0	NRC-M3-BLDG	Building upgrade	Chiller and power upgrades for high-temp load frame operation David Backman $35K AUC 8-4259	Sylvie Béland (S#) Serial:	no	This was a building power upgrade - consider together with ID 326		n/a - see notes	n/a
376	E135	NRC-M3-100B	3.24 Experimental Mechanical Lab	Blackbody source and controller system David Backman $25k see 8-5257	TECHNO-TEST (S#1075761) Serial:	YES	Wall mounted control box		n/a - see notes	n/a
377	E68	NRC-M3-100	3.23 Material and Component Testing	MTS Criterion Series 40 Electromechanical Universa Andrew Christie $86k	Min Liao (S#) Serial:	YES	Needs UPS. Load Frame 9		4-8 ft height range	under 2000 lb.
~~378~~	~~0~~	~~NRC-M4-117A~~	~~Not Assigned (Not Included in Scope)~~	~~REMOVE - OVEN,VACUUM,INTER DIAM 18 X 18 X 18 TEMP.,M:DP-41 A Christie - composites lab m4 AMTC NA~~	~~CANLAB DIV.OF MCGAW SUPPLY LTD (S#1017825) Serial:205004~~	~~no~~				
~~379~~	~~0~~	~~NRC-M4-117A~~	~~Not Assigned (Not Included in Scope)~~	~~Temperature Control for Elevated Temp Testing Simon Hind $17K AUC 8-3805~~	~~S Hind (S#) Serial:~~	~~no~~				
380	0	NRC-M7-130C	3.6 Control Room Spin Rig	SCOPE,DIGITAL,YOKOGAWA DL708 W/ISOLATION & HIGH VO	YOKOGAMA (S#1001086) Serial:28VJ0126	no	small equipment		1	15
381	E69	NRC-M7-G31	3.5 Spin Rig	SPIN RIG TEST SYSTEM MODEL 248710	TEST DEVICES INC. (S#1009601) Serial:S-2093	YES	This equipment requires a room conforming to Test Devices specifications. This includes design consideration for protection from burst debris with high kinetic energy (several million foot-pounds). See supplimentary data for basic electrical requirements. It would be preferred to provide facility installation drawings to Frameworks because integration into building services and infrastructure is complex. A 3" vacuum exhaust to outdoors is required.	Cooling water is required during heated tests for lid. Currently it is a single pass setup. 2x storage cabinets	12	<20000
382	0	NRC-M7-G31C	3.7 Spin Rig Prep Room	SLIP RING ACCESSORY FOR SPIN RIG TEST SYSTEM	TEST DEVICES INC.(BREITHAU) (S#1009601) Serial:	no	Spin rig accessory. Small part.		N/A	50
383	E70	NRC-M7-G31B	3.6 Control Room Spin Rig	SPIN RIG TEST SYSTEM MODEL 248710 $164K Sandi Robertson	Peter Au (S#1009601) Serial:S-2093	YES	Control Room to the Test Devices Spin Rig. Requires adjacent location to Spin Rig Facility. Control system and console requires extensive electrical integration with spin rig and instrumentation hardware. NRC recommends sharing this information with Frameworks as this integration is complex.	Power connection to Vac Skid on Spin Rig. Primary work surface is the control console desk @ 60"	6	500
384	0	NRC-M7-125	3.7 Spin Rig Prep Room	BOROSCOPE 5MM/VIDEOSCOPE SYSTEM,W OPTICAL TIP KIT Shannon Smith	EVERES VIT (S#1043254) Serial:0151B5808	no	Spin rig accessory. Small part.		N/A	5
385	0	NRC-M7-130A	3.7 Spin Rig Prep Room	8 CHANNEL ANALYZER -[Sandy Robertson] black case Clinton Carengie email confirm	Dalmar (S#1036250) Serial:30267	no	Spin rig accessory. Small part.		1	1x2
386	0	NRC-M7-130B	3.7 Spin Rig Prep Room	NON-CONTACT BLADE TIP-TIMING AND TIP NI-PXI-8104 Bonnie	HOOD TECHNOLOGY (S#1083772) Serial:V08X022CD	no	Spin rig accessory. Small part.		N/A	
387	E71	NRC-M7-G30A	4.1 Spin and Burner Rig Equipment Support Room	Air Compressor for HTM facilities	0	YES	Needs to be adjacent to the Spin Rig Facility. Suggested that Air receiver associated with the spin rig be added to this room. Room Requires makeup air	Requires Cooling Tower - High Volume Make up air required for compressor to function efficiently	8	10000
388	E72	NRC-M14-108G	4.1 Spin and Burner Rig Equipment Support Room	Air Compressor for burner rig facilities	0	YES	Room needs to be in close prox to The Becon Burner Rig facilities (LCS-4B and LCS-4C). Required Foot Print encompasses Gardner Denver Air Dryer for Burner Rig - HPRP12509VXRD1250GD S/N WH12S09575011 2022 and Burner rig Air Receiver	Requires Cooling Tower - High Volume Make up air required for compressor to function efficiently	8	10000
389	E73	TSB-U100-26	3.25 Non Destructive Evaluation	X-Ray system	North Star Imaging, model: X-View X500	YES	See OFS Rpt 2017 - p 126-130 for details			
390	E186	TSB-U100-50	3.20 Microscope Lab	Hardness Tester	Clark - Model CN-100 AT Microhardness	YES	changed to yes because it would be placed in permanent spot; small, fits on countertop	changed the name from Clemex microscope to Clark hardness tester		
391	0	TSB-U100-14	3.3 Flight Recorder + NVM	Flight Data Recorder	GE CVFDR	no				
392	E199	TSB-U100-46	3.26 Physical and Fracto Analysis Room	FTIR Spectrometer	Perkin elmer spectrum 100, model; L125000B ATR	YES	changed to yes because it would be placed in permanent spot; small, fits on countertop			
393	E188	TSB-U100-50	3.20 Microscope Lab	Leica Microscope	Leica model: Z6APO	YES	changed to yes because it would be placed in permanent spot; small, fits on countertop			
394	E153	TSB-U100-5	3.21 Metallographic Sectioning and Specimen Extraction	Cut off Machine	Struers, model: AXITOM	YES	this should be in new space code 3.21 Metallographic sectioning; re-mapped to 3.21	Cabinet saw with adjacent roller/Toolbox	6ft	2000
395	E74	TSB-U100-5	1.2 TSB High Bay	Electric Forklift	Daewoo Model BC25S-2	YES		Large adjacent Battery Charger, 2.5Wx2Dx4H	7.5 ft	10,272
~~396~~	~~E75~~	~~TSB-U100-5~~	~~1.2 TSB High Bay~~	~~Band Cut Off Saw~~	~~Startrite Model H250M~~	~~no~~	~~blade to be disposed~~	[illegible]	~~3~~	~~1000~~
397	E76	TSB-U100-5	1.2 TSB High Bay	Vertical band saw	Marvel Series 8 Mark III	YES		Large cabinet aditional for hold down equipment, plus roll around toolbox for tools and related equipment adjacent to machine.	8	3500
398	E169	TSB-U100-2	2.5 Machine Workshop	Vertical band saw	Startrite model 30-R-10	YES		2/3 wheel bandsaw with blade welding capabilities required to cut up wreckage like aircraft control surfaces (wing/rudder etc.	6	1500
399	E134	TSB-U100-2A	2.6 Welding Workshop	Belt Sander	Delta model 52-6110	YES	changed space code to 2.6 Welding shop as per Workshop 5	Belt/Disc sander/Grinder used for large metal sample preparation, need water nearby to cool parts.Used for metal grinding, lots of sparks and dust.	4	300
400	0	TSB-U100-14	3.3 Flight Recorder + NVM	Digital Recorder	SSDVDR-120-4X	no				
401	0	TSB-U100-13	Not Assigned (Office Area)	Fire Safe	Fire King Safe	no				
~~402~~	~~0~~	~~TSB-U100-53A~~	~~3.22 Metallographic Sample Preparation~~	~~Hardness Tester~~	~~Clark - Model CN-100 AT Microhardness~~	~~no~~	~~changed to yes because it would be placed in permanent spot; small, fits on countertop~~	~~THIS IS THE SAME AS THE CLEMEX "MICROSCOPE" should be in microscopy lab, see ID390; deleted- duplicate of ID390~~		
403	E194	TSB-U100-53	3.22 Metallographic Sample Preparation	Metallurgical press	Beuhler Simplimet 3000	YES	changed to yes because it would be placed in permanent spot; small, fits on countertop	this should be in new space code 3.22 metallographic sample prep; re-mapped to 3.22		
404	E172	TSB-U100-3A	2.6 Welding Workshop	MIG Welder	Millermatic 252 w/30A Spoolgun	YES		Portable Large Mig Welder. Have Plasma Cutter and Tig welders as well. Need large cabinet for welding cutting consumables and tools, 48 inches wide x 30 inches deep x 72 inches high. Portable Fume Extraction Required	3	300
405	E193	TSB-U100-53	3.22 Metallographic Sample Preparation	Automatic Polishers	Model: Struers TegraPol 31/ Tegra For	YES	changed to yes because it would be placed in permanent spot; small, fits on countertop	this should be in new space code 3.22 metallographic sample prep; re-mapped to 3.22		
406	E170	TSB-U100-2	2.5 Machine Workshop	Surface Grinder	Victor 20 Model # 1020AH	YES	Self contained hydraulic power unit included in dimensions.	Large noisy dynamic dirty equipment that automatically grinds surfaces to precission finish and depth. Machine to be placed in a corner at 45 degrees to wall for safety if part was to fly from machine. Ideal dimensions provided allow for floor mounted cooling and hydraulic equipment and maintenance access around machine.Large oscillating Electric Hydraulic table.	6	3500
407	0	TSB-U100-3	2.1 Tear down Workshop	Noncontact Measurment System - NextSense C40	NextSense Calipri Model- C40	no			NA, Brief Case Size Equipment	10
408	E77	TSB-U100-2	2.5 Machine Workshop	Milling machine	Lilian Model 5V3	YES		Machine is to be centered in the ideal area left to right, but must be 2 feet from the back wall. Ideal dimensions provided allow for maintenance, workpiece, access and distance to another machine. Workbench and cabinet for heavy vice, lots of tooling and collets.	8	3500
409	0	TSB-U100-40	3.3 Flight Recorder + NVM	Temperature and Humidity Controlled chamber for electronics	Espec SH-241 Temperature/ Humidity Chamber	no				
~~410~~	~~0~~	~~TSB-U100-4~~	~~3.24 Experimental Mechanical Lab~~	~~Optical Comparator~~	~~Jones Lamson Epic 14 Optical comparator~~	~~no~~	~~delete - was disposed of~~			
~~411~~	~~0~~	~~TSB-U100-49~~	~~3.2 Chemical Lab~~	~~Fume Hood~~	~~CANLAB model: 30-270-08 PNB#12, type CAV~~	~~no~~			~~NA, Not Moving~~	
~~412~~	~~0~~	~~TSB-U100-5~~	~~1.2 TSB High Bay~~	~~Overhead Crane - Gantry, 5 T~~	~~Munck Model 12FF1401122~~	~~no~~		~~NA, Not Moving~~	~~NA, Not Moving~~	
~~413~~	~~0~~	~~TSB-U100-3~~	~~2.1 Tear down Workshop~~	~~Overhead Crane - Monorail, 1 T~~	~~Electric Chain Hoist: Jet Model 1BS, Hitachi Trolley details on nameplate~~	~~no~~	~~New crane required in new building~~	~~NA, Not Moving~~	~~NA, Not Moving~~	

ID	Foot Print WxL (ft)	Ideal Area Required WxL (ft)	Footprint Metric WxL (metric)	Ideal Area Required WxL (metric)	Ideal Room Height	Power Requirement (Req'ment more than 120V)	Fuel Consumed	Process Cooling Required	Back-up Power Required	Primary Power	Secondary Power	Tertiary Power	Quaternary Power	Additional Power	Process Cooling	City Water Backup	Compressed Air	City Water Supply
372	12X5	20X20	3660 x 1525	6100 x 6100	Mid-bay	High	No	No	No	110V 20A	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
373																n/a		n/a
374	4x4	Hopefully not required			Hopefully not required	n/a	n/a	n/a	n/a	Should not be required. Should be cooled by building cooling???	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
375	n/a	n/a			n/a	n/a	n/a	n/a	n/a	consider together with ID 326	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
376	3X3'	3X3 ft stand against the wall	910 x 910	910 x 910	n/a	n/a	n/a	n/a	n/a	240v 20A	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
377	11X3	15x9	3355 x 915	4575 x 2745	Mid-bay	Normal	No	No	No	240V 20A	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
~~378~~																		
~~379~~																		
380	1x2									110 VAC								
381	14.5x46	20x50	4425 x 14020	6100 x 15240	Mid-bay	High	No	Yes	Yes							No	Yes	Yes
382																		
383	23 X 9	20 X 9	7015 x 2745	6100 x 2745	Normal	Normal	No	No	Yes							No	Yes	No
384																		
385										120 VAC 1Ph, 15 A								
386																		
387	6x10	6x10	4425 x 4575	6100 x 4575	Mid-bay	High	No	Yes	No	600 VAC, 3Ph, 400 A					cooling tower water	No	No	No
388	6x10	6x10	4575 x 6100	6100 x 9150	Mid-bay	High	No	Yes	No	600 VAC, 3Ph, 400 A					cooling tower water	No	Yes	No
389	8.25 x 10.67	58 sq m	2595 x 3355		Normal	High	No	Yes	No	240 VAC/ 1 Phase/ 60A				No UPS/ Back up Needed	Cooling to 18 deg C as per OEM requirement,[min 30%, max 60% RH load]			
390	3x3	6x3	915 x 915	1830 x 915														
391																		
392	3x3	5x3	915 x 915	1525 x 915														
393	3x3	6x3	915 x 915	1830 x 915														
394	4x5	10x8	1220 x 1525	3050 x 2440	Normal	yes, 220v, 3 Ph, 20A	no	yes, self contained flood cooling	no	220/3phase?	110 for pump	NA	NA	No	yes, self contained flood cooling	No	yes	yes
395	4 x 10.5	8 X 12	1220 x 3200	2440 x 3660	Normal	yes, 600v, 12A, 60HZ, 3 Ph	No	No	No	Battery operated w 600 v charger station	NA	NA	NA	No UPS/ Back-up Needed	None	No	No	No
~~396~~	[illegible]	[illegible]	[illegible]	[illegible]	~~Normal~~	[illegible]	~~No~~	~~yes~~	~~No~~	[illegible]	~~NA~~	~~NA~~	~~NA~~	[illegible]	[illegible]	~~No~~	~~yes~~	~~Yes~~
397	6 x 9	25x15,Large/ indeterminant work pieces	1830 x 2745	7620 x 4575	Normal	460V, 3 ph, 12A	No	yes	No	460V/ 3Phase /60 Hz, 12 A	NA	NA	NA	No UPS/ Back-up Needed	Yes, self contained flood cooling.	No	yes	yes
398	6 x 4	10 x 20	1830 x 1220	3050 x 6100	Normal	550v, 3 ph, 30A	No	No	No	600V /3 Phase /30A, 1.5 HP	120, 15a for attached blade welder	NA	NA	No UPS/ Back-up Needed	None	No	Yes	No
399	3x3	10x10	915 x 915	3050 x 3050	Normal	230V, 1 ph, 10 A	No	No	No	220v,30a	NA	NA	NA	No	No	No	Yes	Yes
400																		
401																		
~~402~~	~~n/a~~	~~n/a~~																
403	2x3	3x3	610 x 915	915 x 915														
404	3x4	Welding Shop	915 x 1220		Normal	220V/30A	No	No	No	220v,30a	NA	NA	NA	Yes	No	No	Yes	Yes
405	2x3	4x3	610 x 915	1220 x 915														
406	8x7	14x10	2440 x 2135	4270 x 3050	Normal	220v,15 A,3 ph.	No	Yes	No	220v,15A, 3PH	Hydraulic power unit	Na	Na	Na	yes, self contained flood cooling.	No	Yes	Yes
407	NA																	
408	8 x 8	14 x 14	2440 x 2440	4270 x 4270	Normal	600v/10A	No	Yes	No	600V /3 Phase /10A, 7.5 HP	110 for computer control unit	NA	NA	No UPS/ Back-up Needed	Yes, self contained flood cooling.	No	Yes, 2 supply fittings required	Yes
409																		
~~410~~																		
~~411~~																		
~~412~~																		
~~413~~																		

ID	Effluent Plumbing Requirements	Compressed Gases	Natural Gas used?	Flammable Compressed Gases	Special Ventilation	Operating temperatures (deg Celsius)	Sensitive to vibrations?	Noisy equipment?	Lifting Aids	Primary Work Surface	Secondary Work Surface	Equipment Rack	Storage Type	Additional Spec Sheet Available	Network Connection (Y/N)	External Dedicated Equipment (Y/N)	External Dedicated Equipment Dimensions (W x L x H inches)	External Dedicated Equipment Clearance (inches)
372	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
373	n/a							n/a										
374	n/a	n/a	n/a	n/a				n/a										
375	n/a	n/a	n/a	n/a				n/a										
376	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
377	n/a	n/a	n/a	n/a				n/a						Yes	Y	Y	already part of column S	already part of column T
~~378~~																		
~~379~~																		
380																		
381	Standard	UHP Argon		None	Vacuum Exhaust	20C to +45C		Yes, 130 dB+	Wall Mounted Jib Crane 1000 lbs with reach over spin rig chamber and vacuum pump system.	Standard 72" Bench	None		Standard Cabinet 36" Wide		Y	Y	already part of column S	already part of column T
382																		
383	None	None		None	None				None	Other (Specify)	HT Bench 72"	19" Rack > 40U	Wall Mount Cabinet 72"		Y	Y	already part of column S	already part of column T
384																		
385																		
386																		
387	None	None		None	high volume make up air and extraction to manage room	5C to 40C			Trolley Chain Hoist Overhead Rail 500 lbs	None	None		Standard Cabinet 36" Wide		Y	Y	already part of column U	already part of column V
388	None	Air		None	high volume make up air and extraction to manage room temperature	5C to 40C			None	None	None		Standard Cabinet 36" Wide		Y	Y	already part of column U	already part of column V
389															Y	Y	Several Computers and monitors (1 table 36X72 + 1 table 36X180)	
390															Y	Y	10X10X24	12
391																		
392															Y	Y	Unknown at this time	Unknown at this time
393															Y	Y	12x12x12	12
394	Drain	No	no	No	No	Room	No	No	No	12 x 8	3x5	No	mobile Tool Box		N	N	NA	NA
395	None	No	No	Yes, when charging Batteries	Open air when batteries off gassing	Room	No	No	No	NA	NA	Yes, med and long fork extensions	Inspection list,log book, key control box		N	Y	24x24x48	24
~~396~~	~~Drain~~	~~No~~	~~No~~	~~No~~	~~No~~	~~Room~~	~~No~~	~~No~~	[illegible]	~~NA~~	~~NA~~	[illegible]	[illegible]		~~N~~	~~N~~	~~NA~~	~~NA~~
397	Drain	No	No	No	No	Room	No	Yes, Normal for a machine shop.	yes, to hold heavy work pieces (rail section) Fork lift and crane to load workpieces	3x3	NA	Yes, spare Blades	Cabinet,48"Wx 30"Dx72"H for spare blades		N	N	NA	36
398	None	No	No	No	No	Room	No	Sometimes, Normal for a machine shop	No	3x3	NA	No	Cabinet for blade storage, 48" wide x 30" deep x 72" high		N	N	NA	NA
399	None	No	No	No	Yes	Room	No	Yes, Normal for a welding shop.	No	3x3	NA	No	Cabinet for Spare Abrasive Belts, 36"Wx24"Dx36" H		N	N	NA	NA
400																		
401																		
~~402~~															~~N~~	~~N~~	~~NA~~	~~NA~~
403															N	N	NA	NA
404	Sink/Drain	Yes	No	No	Yes	1500-2000F Weld Puddle	No	Yes, Normal for a welding shop.	Yes, to hold heavy work pieces (EX rail Coupler, 700 lbs.)	4x6 foot heavy duty welding table	None	Yes, welding equipment cables	Cabinet for Welding PPE, Equipment, Tools, Supplies		N	N	NA	NA
405															N	N	NA	NA
406	Drain	No	No	No	Yes	Room	No	Yes, Normal for a machine shop.	No	3x5	None	No	Cabinet for stones and tools		N	N	NA	NA
407																		
408	Drain	No	No	No	No	Room	No	Yes	Yes	3x5	Yes, 3 x6	No	Large adjacent cabinet for heavy tooling		N	N	NA	NA
409																		
~~410~~																		
~~411~~																		
~~412~~										~~Not Moving~~								
~~413~~										~~Not Moving~~								

ID	REVIT Type ID	OLD Space Code (Building & Rm No.)	NEW Space Code	Name	Manufacturer (Make & Model)	Considered for Functional Program	Notes	Notes Other	Equipment height (ft)	Equipment weight (lbs)	Foot Print WxL (ft)	Ideal Area Required WxL (ft)	Footprint Metric WxL (metric)	Ideal Area Required WxL (metric)	Ideal Room Height	Power Requirement (Req' more than 120V)	Fuel Consumed	Process Cooling Required	Back-up Power Required	Primary Power	Secondary Power	Tertiary Power	Quaternary Power	Additional Power	Process Cooling	City Water Backup	Compressed Air	City Water Supply	Effluent Plumbing Requirements	Compressed Gases	Natural Gas used?	Flammable Compressed Gases	Special Ventilation	Operating temperatures (deg Celsius)	Sensitive to vibrations?	Noisy equipment?	Lifing Aids	Primary Work Surface	Secondary Work Surface	Equipment Rack	Storage Type	Additional Spec Sheet Available	Network Connection (Y/N)	External Dedicated Equipment (Y/N)	External Dedicated Equipment Dimensions (W x L x H inches)	External Dedicated Equipment Clearance (inches)
414	E78	TSB-U100-34	3.19 SEM Lab	Scanning Electron Microscope	Hitachi Model S-3600N	YES		Machine requires adjacent room for vaccum pumps and prep room	6	2000	OLD 8x5	15.5x12	2440 x 1525	4725 x 3660	Normal	Yes	No	Yes	No	240 v, 60HZ,	110 v Printer, computers	NA	NA	NA	Yes, building supplied cold water in and out.	No	Yes	Yes	Yes	Yes	No	No	AC for Room	Cool Room	Very	Yes, pumps to be in separate room	No	4x3	3x4	Yes, # computers	Cabinets for Log Book		Y	Y	48x72x24	24
415	E211	TSB-U100-48	3.4 Avionics Lab	Hirox Digital Microscope	Hirox microscope Model: KH-7700	YES	changed to yes because it would be placed in permanent spot; small, fits on countertop				3x3	4x3	915 x 915	1220 x 915																													Y	Y	36x36x36	6
416	E198	TSB-U100-53A	3.22 Metallographic Sample Preparation	Rockwell Hardness Tester	Newage Rockwell Model NI-400C15	YES	changed to yes because it would be placed in permanent spot; small, fits on countertop				2x3	3x3	610 x 915	915 x 915																													Y	N	NA	NA
417	0	TSB-U100-3	2.1 Tear down Workshop	Boroscope - Video inspection system w probes, tips	Everest Model XLG3;	no		NA	NA, Brief Case Size Equipment																													Briefcase size								
418	0	TSB-U100-50	3.20 Microscope Lab	Clemex Camera	Camera for microhardness tester and Clemex software upgrade (see 101394)	no																																								
419	E197	TSB-U100-26A	3.22 Metallographic Sample Preparation	Brinell Hardness Tester	Brinell Hardness Tester mdl: NB3010LB	YES	changed to yes because it would be placed in permanent spot re-mapped to lab 3.22				2x3	4x3	610 x 915	1220 x 915																													Y	Y	36x24x24	12
420	0	TSB-U100-44	3.1 Photo Lab	Nikon microscope	Nikon model SMZ-1	no																																								
~~421~~	~~0~~	~~TSB-U100-2B~~	~~3.21 Metallographic Sectioning and Specimen Extraction~~	~~Linear Precision Saw~~	~~Struers ISOMET 4000~~	~~no~~	~~duplicate; removed in V 3.18~~		NA, Matlab counter top Equipment		~~2x2~~	~~3x3~~																										Not					~~N~~	~~N~~	~~NA~~	~~NA~~
422	E79	TSB-U100-2	2.5 Machine Workshop	Lathe	Model : Ferro 20	YES			5.5	5000	10 x 5	15 x10	3050 x 1525	4575 x 3050	Normal	600v, 3 ph, 30 A, 20 HP	No	Yes	No	600V /3 Phase /30A, 20 HP	Tool Post Grinder, Digital Readout	NA	NA	No UPS/ Back-up Needed	Yes, self contained flood cooling.	No	Yes	Yes	Drain	No	No	No	No	Room	No	Yes, normal for a machine shop	Yes		3x5		Large HD Cabinets for tooling and chucks, additional roll around toolbox		N	N	NA	NA
423	0	TSB-U100-13	Not Assigned (Office Area)	Microfilm scanner/ reader	ScanPro 220, Digital microfilm scanner	no	Should be in a library or similar space		n/a - see notes																																					
424	0	TSB-U100-5	1.2 TSB High Bay	Rigging Beam	Custom made to gantry crane, not applicable @ new site?	YES		Custom made multiple liftpoint, multiple sling point lifting beam to lift wreckage with awkward c of g. Used with O/H cranes to move wreckage, Keep.	3	1520	1x24	1x25			Sky Height	NA	No	No	No	NA	NA	NA	NA	NA	NA	No	No	No	NA	No	no	No	NA	NA	No	No	That is what it is.	NA	NA	Yes, wall mounted styrups.	Crane access to wall mount.		N	N	NA	NA
425	E154	TSB-U100-5	1.2 TSB High Bay	Floor Scrubber	Wlk behind floor scrubber from Swish	YES		Need dedicated area for floor cleaner and supplies to store brushes, change cleaning fluid, charge battery etc. Store in Highbay.	4	300	3x5	Hanger Floor	915 x 1525		Normal	110	No	No	No	Na	NA	NA	NA	NA	NA	Yes	No	Yes	Drain	Na	Na	No	No	Room	No	No	No	NA	NA	No	Need slop sink access to drain and wash out machine		N	N	NA	NA
426	E239	TSB-U100-53	3.22 Metallographic Sample Preparation	Polisher/ etcher	Buehler Electromet Polisher/ Etcher	YES	changed to yes because it would be placed in permanent spot; small, fits on countertop	this should be located in 3.22 metallurgical sample prep; re-mapped to 3.22			6x3	6x3	1830 x 915	1830 x 915																													N	N	NA	NA
427	E212	TSB-U100-4	3.24 Experimental Mechanical Lab	Microscope w granite table	Stereo Microscope by American Optical	YES	changed to yes because it would be placed in permanent spot				3x3	4x3	915 x 915	1220 x 915																													N	Y	12x12x6	12
428	E183	TSB-U100-4	3.24 Experimental Mechanical Lab	Charpy Impact Tester w digital display and h/c bath	Charpy Impact Tester SATEC SI-IK3, heating/ cooling bath, digital display system	YES	only keep one (TSB or NRCs)				5x5	6x10	1525 x 1525	1830 x 3050																													N	Y	18X18X18	18
429	0	TSB-U100-4	3.24 Experimental Mechanical Lab	Video System w probes and case	Welch Allen video Probe 2000 System, video Probe w case Model VS324	no																																								
430	0	TSB-U100-4	3.24 Experimental Mechanical Lab	Height Gauge	Tesa Micro Hite II Height Gauge System	no																																								
431	E80	TSB-U100-4A	2.1 Tear down Workshop	Hydraulic Test Bench	Hydraulic test bench Model: C-5691 by Bendix/ Rousseau Controls	YES	Although there is room in the TSB high bay for this item it was not the oriiginal intent to have a piece of test equipment in the high bay . NRC has stated that they do not wish to have the device in the clean rooms. Therefore, the hydraulic tester could be in the high bay, the teardown shop or the test room. It cannot be in the metalllurgy room or the microscope rooms. It should not be in the NRC high bay either as we could be testing sensitive wreckage items that need to remain on the TSB side of the house. There is good reason to have it in the teardown shop. Re-mapped to 2.1				3.25 x 7.67	10 X 9	990 x 2340	3050 x 2745	Normal	High	No	No	No	600V /3 Phase /30A, 20 HP				No UPS/ Back-up Needed	None																		N	N	NA	NA
~~432~~	~~0~~	~~TSB-U100-5~~	~~1.2 TSB High Bay~~	~~Rescue Kit - Chemical Suit w Scott Air Pak~~	~~Scott Air Pak w full chemical suit for rescue~~	no		~~NA,Disposed of~~	~~NA, Disposed of~~																																					
433	E213	TSB-U100-48	3.4 Avionics Lab	Microscope	Wild Leitz Model 246634-M420	YES	changed to yes because it would be placed in permanent spot; small, fits on countertop				2x3	3x3	610 x 915	915 x 915																													N	Y	18X18X12	12
434	E214	TSB-U100-48	3.4 Avionics Lab	Microscope with dampening table and camera assembly	Wild Model M7A, vibration dampening table, digital camera by Leica	YES	changed to yes because it would be placed in permanent spot; small, fits on countertop				5x3	6x3	1525 x 915	1830 x 915																													N	Y	12X12X12	12
435	0	TSB-U100-44	3.1 Photo Lab	Light Stand system	Light Stand, Foster & Freeman VSC-1	no																																								
436	0	TSB-U100-44	3.1 Photo Lab	Photogrammetry Tools	Micro Photogrammetric System Adam Tech. (MPS2)	no																																								
437	0	TSB-U100-44	3.1 Photo Lab	Surveying systems w Tools	Survey Equipment Lecia Dior 3002S and Leica T1010	no																																								
438	E215	TSB-U100-4	3.24 Experimental Mechanical Lab	Microscope	Wild M8 Medical Microscope w/650 Rolling Floor Stand	YES	changed to yes because it will likely stay in same room Footprint is 34" x 34"				4x4	4x4	1220 x 1220	1220 x 1220																													N	Y	12x12x12	12
~~439~~	~~0~~	~~TSB-U100-5~~	~~1.2 TSB High Bay~~	~~Cleaning Device/ Parts Cleaner~~	~~Branson Ultrasonic vapour degreaser~~	no		~~NA,Disposed of~~	~~NA, Disposed of~~																																					
440	E155	TSB-U100-5	1.2 TSB High Bay	Magnetic Particle Inspection System	Magnetic particle inspection machine by Advance Machine Co.	YES		Very Large, Powerful Magnetic Particle Inspection Bench, Cannot be located near computers due to large magnetic field when in oppereation.Kerosene filled sump, huge power for magnets	8	5000	10 x 6	12 x 10	3050 x 1830	3660 x 3050	Normal	600v,200A	no	yes	no	600V /3 Phase /200A	110v, Infrared light	NA	NA	Na	Yes, self contained flood cooling.	No	yes	No	None	no	no	no	no	Room	No	No	no	3 x 10	NA	No	NA		N	N	NA	NA
441	0	TSB-U100-5A	3.25 Non Destructive Evaluation	Ultrasonic Inspection Unit	Ultrasonic inspection unit M90	no	re-mapped to 3.25 NDE Lab	NA, Briefcase size.	NA, Brief Case Size Equipment																																					
~~442~~	~~0~~	~~TSB-U100-5~~	~~1.2 TSB High Bay~~	~~Cut - off machine~~	~~Struers Mesotom Cut-off Machine~~	no		~~NA, Diposed of.~~	~~NA, Disposed of~~																																					
443	0	TSB-U100-5A	3.25 Non Destructive Evaluation	Eddy current tester	Eddy current Mdl EM4300 Tester & probes	no	re-mapped to 3.25 NDE Lab	NA, Briefcase size.	NA, Brief Case Size Equipment																																					
444	E156	TSB-U100-5	1.2 TSB High Bay	Pneumatic tools	Enerpac Tools	YES	Hydraulic Push/pull equipment manually energized by hand pump.		5	2000	4x8	6x10	1220 x 2440	1830 x 3050	Normal	NA	no	No	no	NA	NA	NA	NA	NA	No	No	No	No	None	No	no	No	No	Room	No	No	No	NA	NA	That is what it is.	Roll around A Frame of hydraulic equipment.		N	N	NA	NA
~~445~~	~~0~~	~~TSB-U100-5~~	~~1.2 TSB High Bay~~	~~Cut-off saw~~	~~Buehler Abrasimet Cut-Off Saw~~	no		~~NA, Disposed of.~~	~~NA, Disposed of~~																																					
446	0	TSB-U100-50	3.20 Microscope Lab	CMT Image Analysis system	Clemex Impak/ CMT Image Analysis System	no	changed to no, this is software	this is software which goes with ID 390/402 and ID 450			SAME AS CLARK	SAME AS CLARK																															N	N	NA	NA
447	E185	TSB-U100-50	3.20 Microscope Lab	Discussion Microscope	Discussion Stereomicroscope Wild 355110	YES	changed to yes because it would be placed in permanent spot; small, fits on countertop				4x3	4x4	1220 x 915	1220 x 1220																													Y	Y	24x24x24	12
~~448~~	~~0~~	~~TSB-U100-53A~~	~~3.22 Metallographic Sample Preparation~~	~~Hardness Tester~~	~~Leitz Microhardness Tester~~	~~no~~	~~changed to yes because it would be placed in permanent spot; small, fits on countertop~~	~~removed in V 3.18~~			~~GONE~~	~~GONE~~																															~~N~~	~~N~~	~~NA~~	~~NA~~
449	0	TSB-U100-50	3.20 Microscope Lab	Strain gauge	Strain Gauge Indicator and Switch Unit	no																																								
450	E187	TSB-U100-50	3.20 Microscope Lab	Metallograph	metallograph, leica, MEF4M	YES	changed to yes because it would be placed in permanent spot; small, fits on countertop				4x3	4x4	1220 x 915	1220 x 1220																													Y	Y	24x24x24	12
451	E191	TSB-U100-53	3.21 Metallographic Sectioning and Specimen Extraction	High speed saw w precision table	Struers - Isomet 4000 High Speed Diamond Saw w precision table	YES	changed to yes - 30 inches x 24 inches				2x3	3x3	610 x 915	915 x 915																													N	N	NA	NA
~~452~~	~~0~~	~~TSB-U100-53~~	~~3.21 Metallographic Sectioning and Specimen Extraction~~	~~Press~~	~~Prontopress-2, Struers~~	~~no~~	~~changed to yes because it would be placed in permanent spot; small, fits on countertop~~	~~removed in V 3.18~~			~~GONE~~	~~GONE~~																															~~N~~	~~N~~	~~NA~~	~~NA~~
~~453~~	~~0~~	~~TSB-U100-53~~	~~3.21 Metallographic Sectioning and Specimen Extraction~~	~~Box Furnace w controller~~	~~Lindberg Box Furnace - 1500 degrees, w electronic furnace controller~~	~~no~~			~~NA, Not Moving~~																																					
~~454~~	~~0~~	~~TSB-U100-53~~	~~3.21 Metallographic Sectioning and Specimen Extraction~~	~~Polishing machine~~	~~Buehler Vibromet 2 Polishing Machine~~	~~no~~	~~changed to yes because it would be placed in permanent spot; small, fits on countertop~~	~~removed in V 3.18~~			~~GONE~~	~~GONE~~																															~~N~~	~~N~~	~~NA~~	~~NA~~
455	E189	TSB-U100-53	3.21 Metallographic Sectioning and Specimen Extraction	Grinding + Polishing systemS	Buehler Handimet Grinding System AND Polimet Grinding System	YES	changed to yes because it would be placed in permanent spot; small, fits on countertop				3x3	4x3	915 x 915	1220 x 915																													N	N	NA	NA
~~456~~	~~0~~	~~TSB-U100-53A~~	~~3.22 Metallographic Sample Preparation~~	~~Hardness Tester~~	~~Rockwell Hardness Tester~~	~~no~~	~~changed to yes because it would be placed in permanent spot; small, fits on countertop~~ ~~Duplicate of ID 416?~~	~~These are duplicates~~																																						
~~457~~	~~0~~	~~TSB-U100-53A~~	~~3.22 Metallographic Sample Preparation~~	~~Hardness Tester~~	~~Brinell Hardness Tester~~	~~no~~	~~changed to yes because it would be placed in permanent spot; small, fits on countertop~~ ~~Duplicate of ID 419?~~	~~These are duplicates~~																																						
458	E192	TSB-U100-53	3.21 Metallographic Sectioning and Specimen Extraction	Cutting Saw	Buehler Isomet 1000 diamond cutting saw	YES	changed to yes because it would be placed in permanent spot; small, fits on countertop				3x3	4x3	915 x 915	1220 x 915																													N	N	NA	NA
459	E190	TSB-U100-53	3.21 Metallographic Sectioning and Specimen Extraction	Cut off saw	Struers Discotom 5 Cut-Off Saw	YES	changed to yes because it would be placed in permanent spot; small, fits on countertop				3x3	4x4	915 x 915	1220 x 1220																													N	N	NA	NA
~~460~~	~~0~~	~~TSB-U100-46~~	~~3.26 Physical and Fracto Analysis Room~~	~~Coating unit~~	~~Vacuum coating unit, Edwards Mdl E12E4~~	~~no~~	~~changed to yes because it would be placed in permanent spot; small, fits on countertop~~	~~removed in V 3.18~~			~~GONE~~	~~GONE~~																															~~N~~	~~N~~	~~NA~~	~~NA~~
~~461~~	~~0~~	~~TSB-U100-46~~	~~3.26 Physical and Fracto Analysis Room~~	~~Carbon determination~~	~~EC-12 carbon determinator, Leco 752-000~~	~~no~~	~~changed to yes because it would be placed in permanent spot; small, fits on countertop~~	~~removed in V 3.18~~			~~GONE~~	~~GONE~~																															~~N~~	~~N~~	~~NA~~	~~NA~~
462	E142	TSB-U100-3	2.1 Tear down Workshop	Hydraulic press	Strong Arm Hydraulic Press	YES	Manual Hydraulic press	Hydraulic 30 ton press to push apart components. Should be upgraded to electric over hydraulic 100 ton for rail related componets.	7	700	4x3	7x6	1220 x 915	2135 x 1830	Normal	NA	No	No	No	NA	NA	NA	NA	NA	No	No	No	No	None	No	No	No	No	Room	No	No	No	NA	NA	No	Cabinet to house press anvils and component holders		N	N	NA	NA
463	0	TSB-U100-3	2.1 Tear down Workshop	Puller set	Snap On Puller Set Wall Unit	no		Can go anywhere.	Can go anywhere																																					

ID	REVIT Type ID	OLD Space Code (Building & Rm No.)	NEW Space Code	Name	Manufacturer (Make & Model)	Considered for Functional Program	Notes	Notes Other	Equipment height (ft)	Equipment weight (lbs)	Foot Print WxL (ft)	Ideal Area Required WxL (ft)	Footprint Metric WxL (metric)	Ideal Area Required WxL (metric)	Ideal Room Height	Power Requirement (Req' more than 120V)	Fuel Consumed	Process Cooling Required	Back-up Power Required	Primary Power	Secondary Power	Tertiary Power	Quartenary Power	Additional Power	Process Cooling	City Water Backup	Compressed Air	City Water Supply	Effluent Plumbing Requirements	Compressed Gases	Natural Gas used?	Flammable Compressed Gases	Special Ventilation	Operating temperatures (deg Celsius)	Sensitive to vibrations?	Noisy equipment?	Lifing Aids	Primary Work Surface	Secondary Work Surface	Equipment Rack	Storage Type	Additional Spec Sheet Available	Network Connection (Y/N)	External Dedicated Equipment (Y/N)	External Dedicated Equipment Dimensions (W x L x H inches)	External Dedicated Equipment Clearance (inches)
464	0	TSB-U100-3	2.1 Tear down Workshop	Tool box sets [Red, Blue , White]	Rolling Tool Box, Snap On	no		Can go anywhere.	Can go anywhere		5x2																																			
465	E143	TSB-U100-3	2.1 Tear down Workshop	Parts Cleaner System	Parts cleaner Model 4500 - varsol tank, Safety Kleen	YES		Portable parts washer with adjacent parts drain table and under storage for parts bins.	6	250	6x3	8x6	1830 x 915	2440 x 1830	Normal	110v,10A	No	No	No	110	NA	NA	NA	no	No	No	Yes	No	None	No	No	No	Open air	Room	No	No	No	3x6	NA	Yes	Worktable to store parts washed		N	N	NA	NA
466	E144	TSB-U100-3	2.1 Tear down Workshop	Engine tools	Pratt & Whitney Engine Tools	YES		Variety of specialized Aircraft engine teardown tools in HD cabinets with HD drawers.	Cabinet	1500	15 x 3		4575 x 915		Normal	NA	No	No	No	NA	NA	NA	NA	No	No	No	No	No	None	NA	NA	No	No	Room	No	No	No	15x3	NA	No	HD Lista tool Cabinets		N	N	NA	NA
467	0	TSB-U100-48	3.4 Avionics Lab	HP 5328A Universal Counter	HP 5328A Universal Counter	no																																								
468	0	TSB-U100-48	3.4 Avionics Lab	Sencore Capacitor /Inductor Analyzer	Sencore Capacitor/Inductor Analyzer	no																																								
469	0	TSB-U100-48	3.4 Avionics Lab	HP 465A Amplifier	HP 465A Amplifier	no																																								
470	0	TSB-U100-48	3.4 Avionics Lab	HP 6218B Power Supply	HP 6218B Power Supply	no																																								
471	0	TSB-U100-48	3.4 Avionics Lab	Megger	Megger	no																																								
472	0	TSB-U100-48	3.4 Avionics Lab	HP 59306A Relay Actuator	HP 59306A Relay Actuator	no																																								
473	0	TSB-U100-48	3.4 Avionics Lab	HP 436A Power Meter	HP 436A Power Meter	no																																								
474	0	TSB-U100-48	3.4 Avionics Lab	Mdl SPC-6-750A Frequency Changer	Mdl SPC-6-750A Frequency Changer	no																																								
475	0	TSB-U100-48	3.4 Avionics Lab	Bruel&Kjaer Sound level meter Vol. 2215	Bruel&Kjaer Sound level meter Vol. 2215	no																																								
476	0	TSB-U100-48	3.4 Avionics Lab	Hewlett-Packard spectrum analyser, 8568A	Hewlett-Packard spectrum analyser, 8568A	no																																								
477	0	TSB-U100-48	3.4 Avionics Lab	H&P modulation Analyser 8901A	H&P modulation Analyser 8901A	no																																								
478	0	TSB-U100-48	3.4 Avionics Lab	H & P 8656B Signal Generator 100KHz-990MHz	H & P 8656B Signal Generator 100KHz-990MHz	no																																								
479	0	TSB-U100-48	3.4 Avionics Lab	400 MHz 4 Channel Scope, Tektronics	400 MHz 4 Channel Scope, Tektronics	no																																								
480	0	TSB-U100-48	3.4 Avionics Lab	HP 6456B DC power supply 100 amp	HP 6456B DC power supply 100 amp	no																																								
481	0	TSB-U100-48	3.4 Avionics Lab	HP 6267B DC power supply 10 amp	HP 6267B DC power supply 10 amp	no																																								
482	0	TSB-U100-48	3.4 Avionics Lab	HP 6267B DC power supply 10 amp	HP 6267B DC power supply 10 amp	no																																								
483	0	TSB-U100-44	3.1 Photo Lab	JVC svhs/vhs/rec/player BRS622DXU	JVC svhs/vhs/rec/player BRS622DXU	no																																								
484	0	TSB-U100-44	3.1 Photo Lab	Dukane Underwater Acoustic Locator System	Dukane Underwater Acoustic Locator System	no																																								
485	0	TSB-U100-44	3.1 Photo Lab	Tape Recorder, Bruel & Kjaer, Mdl 7003/4	Tape Recorder, Bruel & Kjaer, Mdl 7003/4	no																																								
486	0	TSB-U100-14	3.3 Flight Recorder + NVM	Unix C3600 HP used computer w/station	Unix C3600 HP used computer w/station	no																																								
487	0	TSB-U100-14	3.3 Flight Recorder + NVM	NICE DVL Playback Unit for NAVCAN ATS Playback	NICE DVL Playback Unit for NAVCAN ATS Playback	no																																								
488	0	TSB-U100-14	3.3 Flight Recorder + NVM	Digital Audio Playback w/station, Loral	Digital Audio Playback w/station, Loral	no																																								
489	0	TSB-U100-14	3.3 Flight Recorder + NVM	Audio Processor, Mdl PCAPII, DAC	Audio Processor, Mdl PCAPII, DAC	no																																								
490	0	TSB-U100-14	3.3 Flight Recorder + NVM	Honeywell Ground Station for Solid State Recorder Playbacks (PATS, ROSE Playback Software)	Honeywell Ground Station for Solid State Recorder Playbacks (PATS, ROSE Playback Software)	no																																								
491	0	TSB-U100-14	3.3 Flight Recorder + NVM	Adaptive Digital Filter Mdl DAC10241	Adaptive Digital Filter Mdl DAC10241	no																																								
492	0	TSB-U100-14	3.3 Flight Recorder + NVM	Universal Electronics Data Retreival Unit CVR30B/120	Universal Electronics Data Retreival Unit CVR30B/120	no																																								
493	0	TSB-U100-14	3.3 Flight Recorder + NVM	L3/Loral CVR solid state A100S, flight data recorder	L3/Loral CVR solid state A100S, flight data recorder	no																																								
494	0	TSB-U100-14	3.3 Flight Recorder + NVM	Universal SSCVR 30A	Universal SSCVR 30A	no																																								
495	0	TSB-U100-14	3.3 Flight Recorder + NVM	Fairchild FDR F1000	Fairchild FDR F1000	no																																								
496	0	TSB-U100-14	3.3 Flight Recorder + NVM	Honeywell/Sunstrand Solid State Flight Data Recorder SSFDR	Honeywell/Sunstrand Solid State Flight Data Recorder SSFDR	no																																								
497	0	TSB-U100-14	3.3 Flight Recorder + NVM	Allied Signal Solid state cockpit voice recorder	Allied Signal Solid state cockpit voice recorder	no																																								
498	0	TSB-U100-14	3.3 Flight Recorder + NVM	Universal CVR 30A Data Retreival Unit	Universal CVR 30A Data Retreival Unit	no																																								
499	0	TSB-U100-14	3.3 Flight Recorder + NVM	Wave form recorder, Mdl 5180A, H & P	Wave form recorder, Mdl 5180A, H & P	no																																								
500	0	TSB-U100-14	3.3 Flight Recorder + NVM	Racal 7 Track Recorder, 7DS Demo Unit	Racal 7 Track Recorder, 7DS Demo Unit	no																																								
501	0	TSB-U100-14	3.3 Flight Recorder + NVM	Racal 4 Track Recorder, 4DS	Racal 4 Track Recorder, 4DS	no																																								
502	0	TSB-U100-14	3.3 Flight Recorder + NVM	Programmable Power supply H & P 6034A	Programmable Power supply H & P 6034A	no																																								
503	0	TSB-U100-14	3.3 Flight Recorder + NVM	Irig time Generator B, Mdl 9300-7053	Irig time Generator B, Mdl 9300-7053	no																																								
504	0	TSB-U100-14	3.3 Flight Recorder + NVM	HP 8 channel Tape Deck Mdl 3968A	HP 8 channel Tape Deck Mdl 3968A	no																																								
505	0	TSB-U100-14	3.3 Flight Recorder + NVM	H&P 8 chanTape Deck & Options Model 3968A	H&P 8 chanTape Deck & Options Model 3968A	no																																								
506	0	TSB-U100-14	3.3 Flight Recorder + NVM	Function Synthesizer/Generator 3325A, H&P	Function Synthesizer/Generator 3325A, H&P	no																																								
507	0	TSB-U100-14	3.3 Flight Recorder + NVM	HP 8 Channel InstrumentationRecorderMdl3968A	HP 8 Channel InstrumentationRecorderMdl3968A	no																																								
508	0	TSB-U100-14	3.3 Flight Recorder + NVM	HP Oscilloscope Mdl 1340A	HP Oscilloscope Mdl 1340A	no																																								
509	0	TSB-U100-14	3.3 Flight Recorder + NVM	Tektronix Audio Signal Processor TM506A	Tektronix Audio Signal Processor TM506A	no																																								
510	0	TSB-U100-14	3.3 Flight Recorder + NVM	Teac A3440 Tape Deck	Teac A3440 Tape Deck	no																																								
511	0	TSB-U100-14	3.3 Flight Recorder + NVM	Tascam 302 Cassette Tape Deck	Tascam 302 Cassette Tape Deck	no																																								
512	0	TSB-U100-14	3.3 Flight Recorder + NVM	Orban Parametric Equalizer	Orban Parametric Equalizer	no																																								
513	0	TSB-U100-14	3.3 Flight Recorder + NVM	Time Insertion Unit	Time Insertion Unit	no																																								
514	0	TSB-U100-14	3.3 Flight Recorder + NVM	FDR playback	FDR playback - Avionica	no																																								
515	0	TSB-U100-14	3.3 Flight Recorder + NVM	solidstate SSCVR uni	solidstate SSCVR uni	no																																								
516	0	TSB-U100-14	3.3 Flight Recorder + NVM	30 min SSCVR ED 56A	30 min SSCVR ED 56A, A200S	no																																								
517	0	TSB-U100-14	3.3 Flight Recorder + NVM	Solid State FDR S800	Solid State FDR S800, F1200	no																																								
518	0	TSB-U100-14	3.3 Flight Recorder + NVM	ISAT-100 Data Extraction Kit	ISAT-100 Data Extraction Kit, Skytrac	no																																								
519	0	TSB-U100-14	3.3 Flight Recorder + NVM	Honeywell RPGSE Laptop	Honeywell RPGSE Laptop	no																																								
520	0	TSB-U100-14	3.3 Flight Recorder + NVM	175497-01.01 CVFDR	175497-01.01 CVFDR, GE	no																																								
521	0	TSB-U100-14	3.3 Flight Recorder + NVM	Flight Data Retrieval Unit	Flight Data Retrieval Unit, Universal Avionics	no																																								
522	0	TSB-U100-14	3.3 Flight Recorder + NVM	PCMCIA Interface&sof	PCMCIA Interface&sof, GE	no																																								
523	0	TSB-U100-14	3.3 Flight Recorder + NVM	Digital Recorder SSDVDR	Digital Recorder SSDVDR	no																																								
524	0	TSB-U100-14	3.3 Flight Recorder + NVM	SML 01 Signal generator	SML 01 Signal generator, Rohde & Schwarz	no																																								
525	0	TSB-U100-14	3.3 Flight Recorder + NVM	TDS 3054B Oscilloscope	TDS 3054B Oscilloscope, Tektronic	no																																								
526	0	TSB-U100-14	3.3 Flight Recorder + NVM	FSH 3 Spectrum analyser	FSH 3 Spectrum analyser, Rohde & Schwarz	no																																								
527	0	TSB-U100-44	3.1 Photo Lab	BRS-822 SUHS Editor	BRS-822 SUHS Editor, JVC	no																																								
528	0	TSB-U100-44	3.1 Photo Lab	Soundlevel meter2215	Soundlevel meter2215	no																																								
529	0	TSB-U100-3	2.1 Tear down Workshop	Milling Guide RS200	Milling Guide RS200	no		NA, Briefcase size.	NA, Brief Case Size Equipment																																					
530	0	TSB-U100-44	3.1 Photo Lab	VHSEditor brs8224Pro	VHSEditor brs8224Pro	no																																								
531	0	TSB-U100-44	3.1 Photo Lab	BRS622DXU Player	BRS622DXU Player, JVC	no																																								
532	0	TSB-U100-4	3.24 Experimental Mechanical Lab	Impact Energy Display [for Charpy?]	Impact Energy Display	no																																								
533	0	TSB-U100-51	3.4 Avionics Lab	modulation Analyser 8901A	modulation Analyser 8901A, HP	no																																								
534	0	TSB-U100-51	3.4 Avionics Lab	Frequency Changer, SPC-6-750A	Frequency Changer, SPC-6-750A	no																																								
535	0	TSB-U100-51	3.4 Avionics Lab	beacon receiver	beacon receiver	no																																								
536	0	TSB-U100-14	3.3 Flight Recorder + NVM	Navigational Simulation	Navigational Simulation	no																																								
537	0	TSB-U100-44	3.1 Photo Lab	Type 2250 Handled Analyzer incl. calibrator w/ Sound Level Meter	Type 2250 Handled Analyzer incl. calibrator w/ Sound Level Meter, B+K	no																																								
538	0	TSB-U100-48	3.4 Avionics Lab	Oscilloscope, MDO3104	Oscilloscope, MDO3104, Tektronix	no																																								
539	0	TSB-U100-48	3.4 Avionics Lab	NDT EPOCH	NDT EPOCH, OLYMPUS NDT CANADA INC	no																																								
~~540~~	~~0~~	~~TSB-U100-4~~	~~3.24 Experimental Mechanical Lab~~	~~Tensile Tester/ Universal Testing machine~~	~~Satec systems Model # 12BN-12000~~	~~no~~	~~recently delivered and replaces old system~~	~~delete, this is duplicate of ID624~~																																						
541	0	TSB-U100-40	3.3 Flight Recorder + NVM	GROUPING - NVM room	Many small assets, Espec Temp Humidity chamber	no																																								
542	E81	TSB-U100-51	3.4 Avionics Lab	GROUPING - EM Lab -- Faraday Cage	Many small assets like scopes, testers, electronics	YES	Outside dimension is the critical footprint				9.5 x 11.25	9.5 x 11.25	2895 x 3355	2895 x 3355	Normal	Normal	No	No	No	Normal room power outlets 120/ 1/ 15A				No UPS/ Back-up Needed	None																		N	N	NA	NA
543	0	TSB-U100-23	Office Area, adjacent to 3.3 (to be defined)	GROUPING - FDR -- Incidence occurrence Room [Theatre]	Video and sound room for crash review	no	need 2 larger collaboration rooms with similar equipment The collaboration rooms need to be near/adjacent to the Lab.		N/A new space																																					
544	0	TSB-U100-13	Not Assigned (Office Area)	GROUPING - Technical Library	Technical References, Manuals, Eng Guides w mobile shelving	no			N/A Library/office area																																					
545	0	TSB-U100-38	Not Assigned (Communications/Electrical Closet)	GROUPING - IT Server Room	Remote BU room for TSB HQ servers	no			N/A IT Room																																					
546	E165	NRC-M3-100	3.23 Material and Component Testing	Loadframe # 3 5.5 kip (Missing from List)	0	YES	Load Frame # 3		4-8 ft height range	less than 1000 lb.	11X3	15x9	3355 x 915	4575 x 2745																													Y	Y	already part of column S	already part of column T
547	E82	NRC-M3-100	3.23 Material and Component Testing	SPX Blue M Chamber (conditioning chamber)	0	YES			4-8 ft height range	less than 1000 lb.	4X4	8X10	1220 x 1220	2440 x 3050																													N	N	N/A	N/A
548	E82	NRC-M3-100	3.23 Material and Component Testing	Espec conditioning chamber	0	YES			4-8 ft height range	less than 1000 lb.	4X4	8X10	1220 x 1220	2440 x 3050	Mid-bay	High	No	No	No	240V 50A breaker	n/a	n/a	n/a	n/a	n/a	n/a	n/a	yes	water drain	n/a	n/a	n/a				n/a							N	N	N/A	N/A
549	0	NRC-M3-100	3.23 Material and Component Testing	Biax chiller	0	YES	The Biax chiller cools grips heated by an induction heating system. Temp tbd		4-8 ft height range	less than 1000 lb.	Part of Item 326	Part of Item 326			Mid-bay	High	No	No	No	208V 30A 3 phase	48V 30A for heat					n/a		yes	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
550	E83	NRC-M3-100	3.23 Material and Component Testing	Charpy tester	0	YES	Requires extra floor reinforcement.		4-8 ft height range	less than 1000 lb.	12X4	12X8	3660 x 1220	3660 x 2440	Mid-bay	Normal	No	No	No	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
551	E166	NRC-M14-100A	3.23 Material and Component Testing	Loadframe # 1 100 kip (transferred from other department)	0	YES	Needs Hydraulic Supply and existing UPS Needs 208 3 phase and 600V power available close by for environmental test chambers. Load Frame # 14		4-8 ft height range	less than 2000 lb.	11X3	15x9	3355 x 915	4575 x 2745	Mid-bay	Normal	No	No	No	See note	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							Y	Y	already part of column S	already part of column T
552	E84	NRC-M14-108	2.5 Machine Workshop	HAAS VM2 - CNC Milling asset# 3011735	0	YES	cannot back onto wall Needs 6 ft clearance		8-12 ft height range	less than 10000 lb.	9x10	16x16	2745 x 3050	4880 x 4880	Mid-bay	High	No	No	No	600V 40A breaker	n/a	n/a	n/a	n/a	n/a	n/a	yes	n/a	n/a	n/a	n/a	n/a				Very occasionally							Y	Y	already part of column S	already part of column T
553	E85	NRC-M14-108	2.5 Machine Workshop	2nd Hardinge - Lathe asset # 3005745	0	YES	Requires 36" between the back of the machine and wall.		4-8 ft. height range	less than 5000 lb.	3x6	8x14	915 x 1830	2440 x 4270	Mid-bay	High	No	No	No	600V 15A breaker	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
554	0	NRC-M14-108	2.5 Machine Workshop	Delta - Grinder	0	YES	Backing onto wall is fine. Needs 1 ft. clearance		4-8 ft. height range	less than 500 lb.	Combine w/ 555	Combine w/ 555			Mid-bay	Normal	No	No	No	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
555	E86	NRC-M14-108	2.5 Machine Workshop	Robbins & Muer - Grinder asset# 70532	0	YES	Backing onto wall is fine. Needs 1 ft. clearance		4-8 ft. height range	less than 500 lb.	2x8	5x10	610 x 2440	1525 x 3050	Mid-bay	High	No	No	No	600V 15A breaker	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
556	0	NRC-M14-108	2.5 Machine Workshop	Darex - Drill Sharpener	0	YES	Backing onto wall is fine. Needs 1 ft. clearance		4-8 ft. height range	less than 500 lb.	Combine w/ 555	Combine w/ 555			Mid-bay	Normal	No	No	No	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A

ID	REVIT Type ID	OLD Space Code (Building & Rm No.)	NEW Space Code	Name	Manufacturer (Make & Model)	Considered for Functional Program	Notes	Notes Other	Equipment height (ft)	Equipment weight (lbs)	Foot Print WxL (ft)	Ideal Area Required WxL (ft)	Footprint Metric WxL (metric)	Ideal Area Required WxL (metric)	Ideal Room Height
557	E87	NRC-M14-108	2.5 Machine Workshop	Arboga A2608 - Drill	0	YES	Backing onto wall is fine. Needs 1 ft. clearance		4-8 ft. height range	less than 500 lb.	4x6	7x8	1220 x 1830	2135 x 2440	Mid-bay
558	0	NRC-M14-108	2.5 Machine Workshop	Arboga A3008 - Drill Asset# 3028181	0	YES	Backing onto wall is fine. Needs 1 ft. clearance		4-8 ft. height range	less than 500 lb.	Combine w/ 557	Combine w/ 557			Mid-bay
559	E88	NRC-M14-108	2.5 Machine Workshop	Enerpac - Press	0	YES	Backing onto wall is fine. Needs 1 ft. clearance		4-8 ft. height range	less than 1000 lb.	2x4	5x6	610 x 1220	1525 x 1830	Mid-bay
560	E89	NRC-M14-108	2.5 Machine Workshop	HAAS TL1 - CNC Lathe Asset# 3017522	0	YES	Requires 36" between the back of the machine and wall.		4-8 ft. height range	less than 5000 lb.	7.5x7.5	12x14	2285 x 2285	3660 x 4270	Mid-bay
561	E90	NRC-M14-108	2.5 Machine Workshop	DoAll - Vertical Band Saw Asset# 70526	0	YES	cannot back onto wall Needs 6 ft. clearance		4-8 ft. height range	less than 5000 lb.	10x10	14x32	3050 x 3050	4270 x 9760	Mid-bay
562	E91	NRC-M14-108	2.5 Machine Workshop	Startrite - Horizontal Band Saw Asset# 70529	0	YES	Mobile Unit Backing onto wall is fine. Needs 1 ft. clearance		4-8 ft. height range	less than 1000 lb.	4.5x6	10x6	1375 x 1830	3050 x 1830	Mid-bay
563	E92	NRC-M14-108	2.5 Machine Workshop	Monarch - Lathe Asset# 70537	0	YES	Requires 36" between the back of the machine and wall.		4-8 ft. height range	less than 5000 lb.	3x7	9x15	915 x 2135	2745 x 4575	Mid-bay
564	E93	NRC-M14-108	2.5 Machine Workshop	Green Grinder Asset# 68175	0	YES	Mobile Unit Backing onto wall is fine. Needs 1 ft. clearance		4-8 ft. height range	less than 500 lb.	2x2	6x4	610 x 610	1830 x 1220	Mid-bay
565	E94	NRC-M14-108c	2.5 Machine Workshop	Vacuum for milling carbon - piped to HAAS VM2 - CNC Milling	0	YES	Hood required - Shared This Vacuum is used for the CNC Milling m/c and the EDM m/c cannot back onto wall. Hood Shared with item 165		4-8 ft. height range	less than 5000 lb.	3x5	6x7	915 x 1525	1830 x 2135	Mid-bay
566	E95	NRC-M14-108	2.5 Machine Workshop	White Drill Sharpener	0	YES	backing onto wall is fine		4-8 ft. height range	less than 500 lb.	2x2	6x4	610 x 610	1830 x 1220	Mid-bay
567	E96	NRC-M14-108	2.5 Machine Workshop	Sheet Metal Break Asset# 228415	0	YES	Backing onto wall is fine. Needs 3 ft. clearance		4-8 ft. height range	less than 5000 lb.	3x11	12x16	915 x 3355	3660 x 4880	Mid-bay
568	E97	NRC-M14-215A	2.5 Machine Workshop	Sand Blaster Asset# 3028182	0	YES			4-8 ft. height range	less than 500 lb.	5x8	9x11	1525 x 2440	2745 x 3355	Mid-bay
569	E98	NRC-M14-108	2.5 Machine Workshop	Small Manual Metal Shear Asset# 70486	0	YES	Requires 36" between the back of the machine and wall.		4-8 ft. height range	less than 1000 lb.	4x6	10x12	1220 x 1830	3050 x 3660	Mid-bay
~~570~~	~~E99~~	~~NRC-M14-114~~	~~2.6 Welding Workshop~~	~~Stick Welding Machines~~	~~0~~	~~no~~	~~Hood required - Shared This area is too small, should be 1.5 X larger~~		~~4-8 ft. height range~~	~~less than 500 lb.~~	~~5x8~~	~~16X24~~	~~1525 x 2440~~		~~Mid-bay~~
571	E100	NRC-M14-114	2.6 Welding Workshop	- Grinders (2)	0	YES	Hood required - Shared This area is too small, should be 1.5 X larger		4-8 ft. height range	less than 500 lb.	3x5	fits in space with item 570 8x8	915 x 1525		Mid-bay
572	E101	NRC-M14-114	2.6 Welding Workshop	- Work Table (1)	0	YES	Hood required - Shared This area is too small, should be 1.5 X larger		4-8 ft. height range	less than 500 lb.	3x5	fits in space with item 570 8x8	915 x 1525		Mid-bay
573	0	NRC-M14-112	4.15 Machine Shop Tool Room	Machine Tool Crib	0	no	This is a room/space		n/a - see notes	n/a	n/a				Mid-bay
574	E102	NRC-M14-215	2.4 Wood Workshop	Vertical Band Saw	0	YES	Wood shop lay out needs to be discussed . Circulation space needs to overlap with other equipment to fit into a reasonable space. Dust extraction system needs to be considered.		4-8 ft. height range	less than 2000 lb.	5X3	20x40 see Note	1525 x 915	6100 x 12195	Mid-bay
575	E103	NRC-M14-108	2.5 Machine Workshop	presses, punches, notchers, sheet and tube roller	0	YES	26 is running feet and may be split backing onto wall is fine. Needs 1 ft. clearance.		4-8 ft. height range	less than 1000 lb.	4x26	8x30	1220 x 7930	2440 x 9150	Mid-bay
576	0	NRC-M14-114	2.6 Welding Workshop	Plasma Welding Machines	0	YES			4-8 ft. height range	less than 500 lb.	Part of 570	fits in space with item 570			Mid-bay
~~577~~	~~0~~	~~NRC-M14-114~~	~~2.6 Welding Workshop~~	~~MIG Welding Machines~~	~~0~~	~~no~~			~~4-8 ft. height range~~	~~less than 500 lb.~~	~~Part of 570~~	~~fits in space with item 570~~			~~Mid-bay~~
578	E145	NRC-M14-215	2.4 Wood Workshop	Thickness Planer	0	YES	see note 574 also all wood shop equipment is running off of 1 plug on a 600V 15 A circuit.		4-8 ft. height range	less than 500 lb.	Part of 574 3X5	see note 574	915 x 1525		Mid-bay
579	E146	NRC-M14-215	2.4 Wood Workshop	6" jointer	0	YES	see note 574 also all wood shop equipment is running off of 1 plug on a 600V 15 A circuit.		4-8 ft. height range	less than 500 lb.	Part of 574 4x5	see note 574	1220 x 1525		Mid-bay
~~580~~	~~0~~	~~NRC-M14-215~~	~~2.4 Wood Workshop~~	~~12"jointer~~	~~0~~	~~no~~	~~see note 574 also all wood shop equipment is running off of 1 plug on a 600V 15 A circuit.~~		~~4-8 ft. height range~~	~~less than 500 lb.~~	~~Part of 574 4x6~~	~~see note 574~~			~~Mid-bay~~
581	E147	NRC-M14-215	2.4 Wood Workshop	Table Saw	0	YES	see note 574 also all wood shop equipment is running off of 1 plug on a 600V 15 A circuit.		4-8 ft. height range	less than 500 lb.	Part of 574 6x4	see note 574	1830 x 1220		Mid-bay
582	E148	NRC-M14-215	2.4 Wood Workshop	Miter saw	0	YES	see note 574 also all wood shop equipment is running off of 1 plug on a 600V 15 A circuit.		4-8 ft. height range	less than 500 lb.	Part of 574 4x4	see note 574	1220 x 1220		Mid-bay
583	E149	NRC-M14-215	2.4 Wood Workshop	vertical cutting saw	0	YES	see note 574 also all wood shop equipment is running off of 1 plug on a 600V 15 A circuit.		4-8 ft. height range	less than 500 lb.	Part of 574 12X4	see note 574	3660 x 1220		Mid-bay
584	E150	NRC-M14-215	2.4 Wood Workshop	storage cabinet	0	YES	see note 574 also all wood shop equipment is running off of 1 plug on a 600V 15 A circuit.		4-8 ft. height range	less than 500 lb.	Part of 574 4X4	see note 574	1220 x 1220		Mid-bay
585	E151	NRC-M14-215	2.4 Wood Workshop	wood storage rack	0	YES	see note 574 also all wood shop equipment is running off of 1 plug on a 600V 15 A circuit.		4-8 ft. height range	less than 500 lb.	Part of 574 6X4	see note 574	1830 x 1220		Mid-bay
~~586~~	~~0~~	~~TSB-U100-05/02~~	~~1.2 TSB High Bay~~	~~Drill Press~~	~~0~~	~~no~~			~~NA, Not Moving~~						
~~587~~	~~0~~	~~TSB-U100-05/02~~	~~1.2 TSB High Bay~~	~~Drill Press~~	~~0~~	~~no~~			~~NA, Not Moving~~						
588	E104	NRC-M14-130	3.25 Non Destructive Evaluation	Sound Proof Room	0	YES			8	500	8x8	16X14	2440 x 2440	4880 x 4270	Normal
589	E105	NRC-M14-130	3.25 Non Destructive Evaluation	Central work table	0	YES			8	500	4X8	12X16	1220 x 2440	3660 x 4880	Normal
590	E105	NRC-M14-130	3.25 Non Destructive Evaluation	Central work table 2nd required	0	YES			8	500	4X8	12X16	1220 x 2440	3660 x 4880	Normal
591	E105	NRC-M14-130	3.25 Non Destructive Evaluation	Armanda work table	0	YES			8	500	4X8	12X16	1220 x 2440	3660 x 4880	Normal
592	E106	NRC-M14-140	3.25 Non Destructive Evaluation	CT Scanner #1	0	YES			8	500	4X10	8X10	1220 x 3050	2440 x 3050	Normal
593	E107	NRC-M14-140	3.25 Non Destructive Evaluation	CT Scanner #2	0	YES			8	500	4X10	8X10	1220 x 3050	2440 x 3050	Normal
594	E108	NRC-M14-140	3.25 Non Destructive Evaluation	NDT CR Viewing Area including 2 benches and console	0	YES			8	700	10X20	10X20	3050 x 6100	3050 x 6100	Normal
595	E109	NRC-M14-140	3.25 Non Destructive Evaluation	Film Fridge	0	YES			8	500	3X5	6X5	915 x 1525	1830 x 1525	Normal
596	0	NRC-M14-140	3.25 Non Destructive Evaluation	Storage cabinets 16	0	YES			8	300	16@3X3	16@3X6			Normal
597	0	NRC-M14-140	3.25 Non Destructive Evaluation	Work Benches	0	YES			8	500	6@3X6	6@8X6			Normal
598	E110	NRC-M17-113	3.17 Heat Treatment and Coating Lab	Lindburg Furnace	Lindburg	YES	Requires heat/fumes extraction hood.	250VAC 30A. Requires work surface that won't be damaged by high temperatures and has single shelf underneath for the furnace control system.	3	<500	4 x 3	6 x 4	1220 x 915	1830 x 1220	Normal
599	E111	NRC-M14-108G	4.1 Spin and Burner Rig Equipment Support Room	Gardner Denver Air Dryer for Burner Rig - HPRP12509VXRD1250GD S/N WH125085750112022	Gardner Denver	YES	Needs to be located with Gardner Denver EAU99G (250HP) SN S118657 For burner rig.	Requires Cooling Tower - Mid Volume	7	1000	5x5	7 X 7	2135 x 2135	2135 x 2135	Mid-bay
600	E112	NRC-M14-108G	4.1 Spin and Burner Rig Equipment Support Room	Air Receiver for burner rig CRN: L3302-4C SN: 571995	Manchester	YES	Needs to be located with Gardner Denver EAU99G (250HP) SN S118657 For burner rig.		10	2000	5x5	7 X 7	2135 x 2135	2135 x 2135	Mid-bay
601	E167	NRC-M13-045	3.23 Material and Component Testing	MTS Load Frame 3 Poster Fr#6 305.03	MTS System Corporation SN 64	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack	12	1500	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay
602	E168	NRC-M13-045	3.23 Material and Component Testing	MTS Load Frame DND Asset Fr#3	MTS System Corporation	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack	10	1000	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay
603	E113	NRC-M13-045	3.23 Material and Component Testing	MTS 810 Test Frame and Controller 50kip with Controller Frame #18	MTS Systems Corporation Model 810	YES	Test frame - part of standard test frame unit cell. Needs hydraulic supply. See 2 test machine unit cell for definition of all service requirements.	Second 19" Equipment Rack	12	1200	6x3	15x13	1830 x 915	4575 x 3965	Mid-bay
604	E114	NRC-M13-042	Not Assigned (Building Service Area)	Process Water Chiller and Pump UPS Connected	Unknown, ASPM ID 13PCS01	YES					5x6	5x6	1525 x 1830		Normal
605	E115	NRC-M13-050A	4.2 Pump Room	MTS Hydraulic Power Unit Model 515.30	MTS Systems Corporation SN 10494177	YES		Oil Storage			3x6	8x10	915 x 1830	2440 x 3050	Normal
606	E116	NRC-M14-108F	3.15 Burner Rig #2	COMBUSTOR SYSTEM,BECON INCORPORATED LCS-4C, S/N: 02-5625	Becon INC	YES	This equipment requires a room conforming to Becon Specifications which are available. See supplimentary data for electrical requirements. It would be preferred to provide facility installation drawings to Frameworks because integration into building services and infrastructure is complex.		10	2000	9x20	15 X 20	2745 x 6100	4575 x 6100	Mid-bay

ID	Power Requirement (Req' more than 120V)	Fuel Consumed	Process Cooling Required	Back-up Power Required	Primary Power	Secondary Power	Tertiary Power	Quartenary Power	Additional Power	Process Cooling	City Water Backup	Compressed Air	City Water Supply	Effluent Plumbing Requirements	Compressed Gases	Natural Gas used?	Flammable Compressed Gases	Special Ventilation	Operating temperatures (deg Celsius)	Sensitive to vibrations?	Noisy equipment?	Lifing Aids	Primary Work Surface	Secondary Work Surface	Equipment Rack	Storage Type	Additional Spec Sheet Available	Network Connection (Y/N)	External Dedicated Equipment (Y/N)	External Dedicated Equipment Dimensions (W x L x H inches)	External Dedicated Equipment Clearance (inches)
557	High	No	No	No	600V 15A breaker	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
558	High	No	No	No	600V 15A breaker	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
559	High	No	No	No	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
560	High	No	No	No	600V 30A breaker	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				Very occasionally							N	N	N/A	N/A
561	High	No	No	No	600V 30A breaker	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
562	High	No	No	No	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
563	High	No	No	No	600V 15A breaker	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
564	Normal	No	No	No	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
565	High	No	No	No	600V 15A breaker	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
566		No	No	No	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
567	No	No	No	No	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
568		No	No	No		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
569	No	No	No	No	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
~~570~~	~~High~~	~~No~~	~~No~~	~~No~~	~~600V 60A~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~welding gas cylinders~~				~~n/a~~							~~N~~			
571	Normal	No	No	No	110V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
572	Normal	No	No	No	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	simple exhaust bvent to outside			n/a							N	N	N/A	N/A
573		No	No	No	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a										
574	High	No	No	No	all wood shop runs on 1 600V 30A breaker. These circuits should be split into 15 A circuits	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
575	Normal	No	No	No	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
576	600V 50A	n/a	n/a	n/a	600V 60A	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
~~577~~	~~600V 50A~~	~~n/a~~	~~n/a~~	~~n/a~~	~~600V 60A~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~welding gas cylinders~~				~~n/a~~										
578	600V 15A	n/a	n/a	n/a	all wood shop runs on 1 600V 30A breaker. These circuits should be split into 15 A circuits	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				Very occasionally							N	N	N/A	N/A
579	600V 15A	n/a	n/a	n/a	all wood shop runs on 1 600V 30A breaker. These circuits should be split into 15 A circuits	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				Very occasionally							N	N	N/A	N/A
~~580~~	~~600V 15A~~	~~n/a~~	~~n/a~~	~~n/a~~		~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~	~~n/a~~				~~Very occasionally~~										
581	600V 15A	n/a	n/a	n/a	all wood shop runs on 1 600V 30A breaker. These circuits should be split into 15 A circuits	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				Very occasionally							N	N	N/A	N/A
582	600V 15A	n/a	n/a	n/a	all wood shop runs on 1 600V 30A breaker. These circuits should be split into 15 A circuits	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
583	600V 15A	n/a	n/a	n/a	all wood shop runs on 1 600V 30A breaker. These circuits should be split into 15 A circuits	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
584	600V 15A	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
585	600V 15A	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a				n/a							N	N	N/A	N/A
~~586~~																															
~~587~~																															
588	Normal	No	No	No																								N	N	N/A	N/A
589	Normal	No	No	No																								N	N	N/A	N/A
590	Normal	No	No	No																								N	N	N/A	N/A
591	Normal	No	No	No																								N	N	N/A	N/A
592	Normal	No	No	No																								Y	Y	3x3x4	
593	Normal	No	No	No																								Y	Y	3x3x4	
594	Normal	No	No	No																								Y	Y	included in column S	included in column T
595	Normal	No	No	No																								N	N	N/A	N/A
596	none	No	No	No																								N	N	N/A	N/A
597	Normal	No	No	No																								N	N	N/A	N/A
598	High	No	No	No	220 VAC. 40A					None	No	no	No	None	None		None	Extraction Hood Heat/Fumes					Standard 72" Bench					N	N	N/A	N/A
599	High	No	No	No	600 VAC, 3Ph, 15A	None	None	None	None	cooling tower water	No	Yes	No	Oil Seperator	Air		None	high volume make up air and extraction to manage room temperature	5C to 40C			None	None	None		Standard Cabinet 36" Wide		N	N	N/A	N/A
600		No	No	No	None	None	None	None	None	None	No	Yes	No	Oil Seperator	None		None	None	5C to 40C			None	None	None		None		N	N	N/A	N/A
601	High	No	Yes	Yes	Hydraulic	110 VAC	~~None~~	~~None~~	~~No~~	Chiller with Heat Exchanger																		Y	Y	already part of column S	already part of column T
602	High	No	Yes	Yes	Hydraulic	110 VAC			~~No~~	Chiller with Heat Exchanger																		Y	Y	already part of column S	already part of column T
603	High	No	Yes	Yes	Hydraulic	110 VAC	~~None~~	~~None~~	~~No~~	Chiller with Heat Exchanger																		Y	Y	already part of column S	already part of column T
604	Normal	No	Yes	Yes																								N	N	N/A	N/A
605	High	No	Yes	Yes	600 VAC 3Ph, UPS							Yes	Yes													Other (Specify)		Y	Y	already part of column S	already part of column T
606	High	Yes	No	No							No	Yes	Yes	Oil Separator	Nitrogen	No, but equipment can burn NG. We would like to have NG available to this equipment for future connection.	None	Combustion Exhaust. Approximately 8000 CFM make up air and 8000 CFM for exhaust.	`-20C to +45C		Yes, 130 dB+	None	HT Bench 72"	None		Standard Cabinet 36" Wide		Y	Y	already part of column S	already part of column T

ID	REVIT Type ID	OLD Space Code (Building & Rm No.)	NEW Space Code	Name	Manufacturer (Make & Model)	Considered for Functional Program	Notes	Notes Other	Equipment height (ft)	Equipment weight (lbs)
607	E117	NRC-M7-G31A	4.1 Spin and Burner Rig Equipment Support Room	Air Receiver for Test Devices Spin Rig CRN: F6970-5 SN: 182302	Steel Fab	YES	Currently located on the roof of the Spin Rig test cell. Co-located with Sullair Compressor LS-25-300 WC SN: 003-113477		6	?
608	E118	NRC-M17-128A	3.23 Material and Component Testing	Creep Frame	Satec Systems	YES	Comprises test frame, control system and furnace.	requires unexcavated floor, 115V 30A. This equipment will be placed along the "East Wall".	10	700
609	E118	NRC-M17-128A	3.23 Material and Component Testing	Creep Frame	Satec Systems	YES	Comprises test frame, control system and furnace.	requires unexcavated floor, 115V 30A. This equipment will be placed along the "East Wall".	10	700
610	E118	NRC-M17-128A	3.23 Material and Component Testing	Creep Frame	Satec Systems	YES	Comprises test frame, control system and furnace.	requires unexcavated floor, 115V 30A. This equipment will be placed along the "East Wall".	10	700
611	E119	NRC-M17-128	3.17 Heat Treatment and Coating Lab	Heat treatment Furnace - Lindburg	Lindburg Blue	YES	Requires heat/fumes extraction hood.	250VAC 30A. Requires work surface that won't be damaged by high temperatures and has single shelf underneath for the furnace control system.	3	<500
612	E119	NRC-M17-128	3.17 Heat Treatment and Coating Lab	Heat treatment Furnace - Lindburg	Lindburg Blue	YES	Requires heat/fumes extraction hood.	250VAC 30A. Requires work surface that won't be damaged by high temperatures and has single shelf underneath for the furnace control system.	3	<500
613	E119	NRC-M17-128	3.17 Heat Treatment and Coating Lab	Heat treatment Furnace - Lindburg	Lindburg Blue	YES	Requires heat/fumes extraction hood.	250VAC 30A. Requires work surface that won't be damaged by high temperatures and has single shelf underneath for the furnace control system.	3	<500
614	E120	NRC-M17-113A	3.10 Hot Isostatic Press	Glove Box	Invotec	YES	Uses vacuum pump	This equipment will be relocated to 3.10 or 3.9 depending on space. Move to 3.10 and resize space if needed.	6	500
615	E121	NRC-M13-156	4.3 SEM Lab Support Room	WATER CHILLER, LIQUID/LIQUIDSYSTEM	Neslab Instruments Inc., USA, MODEL: 322003040105, SN197240050	YES	process water supply for Hitachi SEM and Edwards carbon coater	Unit specs: -temp range +5°C to+35°C - temp stability ±1.0°C - cooling capacity 5.5 Gpm @ 21.5 psi based on a 10°Cdifference between temp of the cooling water supply (tap or process water) and cooling fluid as it leaves the unit	3	250
616	E122	NRC-M13-156	4.3 SEM Lab Support Room	WATER RECIRCULATING SYSTEM	Harskris Co. , MODEL: RO75, SN H-A10089	YES	process water supply for Philips XL30S FEG SEM	Unit specifications: -temp range 13°C to 30°C -temp stability ± 1.1°C; - coling capacity 100 Gpm @ water pressure 45 psi	3	250
617	E123	NRC-M13-156	4.3 SEM Lab Support Room	UPS UNIT, EATON	Eaton Industries, USA, MODEL: FE 4.3kVA, SN BL024FI005	YES	power supply for Philips XL30S FEG SEM	Unit connected to revesrible transformer 120V to 240V	3	250
618	E124	NRC-M13-164	3.8 TGST Rig	Thermal Gradient Test Rig	Custom Manufacture at NRC	YES	requires extraction	requires noise isolation	8	1000
619	E127	TSB-U100-4	3.24 Experimental Mechanical Lab	Granite Table -Large	Mitutoyo Granite Table (for Height gauge and other), SN:5053-89-2, Asset 102373	YES			3	2000
620	E128	TSB-U100-4	3.24 Experimental Mechanical Lab	Granite Table -Med	Mitutoyo Granite Table SN:5053-89-2	YES			3	600
621	E129	TSB-U100-4	3.24 Experimental Mechanical Lab	Granite Table -Small	Challenge Granite Table	YES			3	200
622	0	TSB-U100-5	1.2 TSB High Bay	ISO Container Corner Caster Wheels	Tandemloc, AC49000A-10PA, CASTER, CONTAINER LOCK, SWIVEL W/LOCK (four assemblies)	YES	Self contained manually operated hydraulics - mobile; not yet aquired Four caster wheels, each 2 ft high by 1 ft wide	Not yet aquired.	3	300
623	0	TSB-U100-5	1.2 TSB High Bay	ISO Container Drawbar	Tandemloc, AB42000A-2PA, TOWBAR, TWISTLOC, WITH 20° ROTATION	YES	Mobile; Not yet acquired. 7 ft long	Not yet aquired.	8	120
624	E130	TSB-U100-4B	3.23 Material and Component Testing	Tensile Tester/ Universal Testing machine	Instron, Model 5969	YES	changed new location to 3.23 Material and Component Testing per workshop 5		7	600
625	0	TSB-U100-5	1.2 TSB High Bay	20 Ton overhead Crane	TBD	YES	Not Yet Aquired Need 2 x 20 Ton cranes	2 Tandem cranes capable of operating paired or independent to offload/move/hold wreckage either together or for concurrent high bay activities.	Not Yet Aquired	
626	E177	NRC-M13-146	3.22 Metallographic Sample Preparation	Struers Lavamin	Struers A/S, SN 62310643	YES	Drain requires sediment trap and water supply	changed to YES	2	100
627	E196	NRC-M13-146	3.22 Metallographic Sample Preparation	Buehler HandiMet 2	Buehler	YES	Drain requires sediment trap and water supply	changed to YES	1	50
628	E178	NRC-M13-146	3.22 Metallographic Sample Preparation	Struers LaboPress-3	Struers A/S, SN 5061286, (S #3005846)	YES	Requires water hook up and drain.	changed to YES	2	100
629	E179	NRC-M13-146	3.22 Metallographic Sample Preparation	Stuers EpoVac	Struers A/S (S#209896) Serial:SN4355894	YES	Requires compressed air source.	changed to YES	2	30
630	E180	NRC-M13-152	4.3 SEM Lab Support Room	Edwards High Vacuum Carbon Coater	Edwards, Model 306, (S #3005806)	YES	Equipment is on mobile base. Vacuum exhausts to room. Requires closed loop process cooling.	This equipment will be installed into proposed SEM Sample Preperation as per discussion during WS#4.	5	300
631	E181	NRC-M13-152	4.3 SEM Lab Support Room	Edwards Sputter Coater	Edwards, Model S150B, SN 54024-1, (S #3005848)	YES	Equipment is for bench use. Vacuum exhausts to room. Compressed Argon is required for coating process	This equipment will be installed into proposed SEM Sample Preperation as per discussion during WS#4.	2	100
632	#N/A	NRC-M13-146	3.22 Metallographic Sample Preparation	Explosion Proof Refrigirator	VWR Scientfic, EX-PR13	Yes			5.5	350
633	#N/A	NRC-M13-146	3.21 Metallographic Sectioning and Specimen Extraction	EROSION TEST RIG	S.S. WHITE TECHNOLOGIES INC, USA MODEL HME, SN 111408, S #3016557	YES	Equipment is for bench use. Attached to fume hoode exhaust via dust collector. Dry, clean compressed air is required for erosion resistnce tests. Compressed Air requirements: pressure max 140 psi		3.6	80
634	#N/A	NRC-M13-146	3.21 Metallographic Sectioning and Specimen Extraction	Dust Collector	DONALDSON TORIT, USA, S #069903	YES	attached to erosion test rig. Connect to vented air exhaust		3.2	220
635	#N/A	NRC-M13-148	3.20 Microscope Lab	HIGH PRECISION ELECTRONIC SCALES	SARTORIUS CORP, USA, Model EB60FEG-1, SN 80702195,S # 069909	YES	Requires installation on vibration suppressing table.	installed on marble untivibration table	0.75	15
636	#N/A	NRC-M13-146	3.22 Metallographic Sample Preparation	PRECISION ELECTRONIC SCALES	Sartorius GMBH Germany, Model R160P, S/N 3601007, S# N/A	YES		Installed on standard 77" bench with erosion test rig	7.5	30
637	#N/A	NRC-M13-146	3.22 Metallographic Sample Preparation	PRECISION ELECTRONIC SCALES	SHINCO DESHICO LTD, JAPAN, MODEL HJ-KKDS6	YES			0.75	30
	#N/A	**NRC SMPL**								
Replacem	#N/A		3.23 Material and Component Testing	550 Kip Load Frame		Yes			Not yet aquired	
Replacem	#N/A		1.1 NRC High Bay	Boom Lift/ Work platform		Yes			Not yet aquired	
Replacem	#N/A		4.2 Pump Room	1 new larger Hydraulic pump to replace some existing pumps		Yes			Not yet aquired	
Replacem	#N/A		3.19 SEM Lab	Scanning electron microscope with SE, BSE, EDS, OIM and WDS		Yes			Not yet aquired	
Replacem	#N/A		x.x Electric room (close to mat.&component testing lab/mid-bay)	UPS needed		Yes			Not yet aquired	
NEW	#N/A		1.1 NRC High bay	Fall arrest anchors/cables in High Bay (built-in), H&S requirements		Yes			Not yet aquired	
NEW	#N/A		3.20 Microscope Lab	New microscopy equipment TBD		Yes			Not yet aquired	
NEW	#N/A		3.21 Metallographic Sectioning and Specimen Extraction	New microscopy equipment TBD		Yes			Not yet aquired	

ID	Foot Print WxL (ft)	Ideal Area Required WxL (ft)	Footprint Metric WxL (metric)	Ideal Area Required WxL (metric)	Ideal Room Height	Power Requirement (Req' more than 120V)	Fuel Consumed	Process Cooling Required	Back-up Power Required	Primary Power	Secondary Power	Tertiary Power	Quartenary Power	Additional Power	Process Cooling	City Water Backup	Compressed Air	City Water Supply
607	7X 15	7 X 15	2135 x 4575	2135 x 4575	Mid-bay		No	No	No	None	None	None	None	None	None	No	Yes	No
608	4 x 6	6 x 8	1220 x 1830	1830 x 2440	Normal	High	No	No	Yes	115VAC, 20A	120 VAC 1Ph, 15 A				None	No	no	No
609	4 x 6	6 x 8	1220 x 1830	1830 x 2440	Normal	High	No	No	Yes	115VAC, 20A	120 VAC 1Ph, 15 A				None	No	no	No
610	4 x 6	6 x 8	1220 x 1830	1830 x 2440	Normal	High	No	No	Yes	115VAC, 20A	120 VAC 1Ph, 15 A				None	No	no	No
611	4 x 3	6 x 4	1220 x 915	1830 x 1220	Normal	High	No	No	No	220 VAC. 40A					None	No	no	No
612	4 x 3	6 x 4	1220 x 915	1830 x 1220	Normal	High	No	No	No	220 VAC. 40A					None	No	no	No
613	4 x 3	6 x 4	1220 x 915	1830 x 1220	Normal	High	No	No	No	220 VAC. 40A					None	No	no	No
614	3x6	6 x 6	915 x 1830	1830 x 1830	Normal	Normal	No	No	No	120 VAC 1Ph, 15 A					None	No	no	No
615	2x2	4x4	610 x 610	1220 x 1220	Normal	Normal	No	Yes	No	120 VAC 1Ph, 15 A	None	None	None	None	Building Process	No	No	No
616	2x3	4x5	610 x 915	1220 x 1525	Normal	Normal	No	Yes	No	230 VAC 1Ph, 20 A	None	None	None	None	Building Process	No	No	No
617	1.5x3	6x6	455 x 915	1830 x 1830	Normal	Normal	No	No	No	230 VAC 1Ph, 20 A	None	None	None	None	None	No	No	No
618	6 x 4	12 x 15	3660 x 4725	3660 x 4725	Normal	Normal	Yes	No	No	120 VAC 1Ph, 15 A					None	No	Yes	No
619	4x8		1220 x 2440															
620	4x4		1220 x 1220															
621	2x2		610 x 610															
622	1x2																	
623	1x7																	
624	4X3	8X6	1220 x 915	2440 x 1830	mid	Single Phase Voltage: 100, 120, 220, or 240 VAC ±10%, 47 to 63 Hz. Power supply must be free of spikes, surges or sags exceeding 10% of the average voltage									no	no	no	no
625																		
626	2x3	3x4	610 x 915	915 x 1220	Normal	Normal	no	Yes	no	120 VAC 1Ph, 15 A	none	none	none	none	none	no	yes	Yes
627	2x3	3x4	610 x 915	915 x 1220	Normal			Yes									No	Yes
628	2x3	3x4	610 x 915	915 x 1220	Normal	Normal	no	Yes	no	230 VAC 1Ph, >20 A	none	none	none	none	none	none	No	Yes
629	2x3	3x4	610 x 915	915 x 1220	Normal	No	No	None	None	None	None	None	None	None	None	None	Yes	None
630	4x3	4x3	610 x 915	915 x 1220	Normal	Normal	no	Yes	no	230 VAC 1Ph, 20 A	none	none	none	none	yes	yes	none	Yes
631	2x3	4x4	610 x 915	915 x 1220	Normal	Normal	none	No	none	230 VAC 1Ph, 20 A	none	none	none	none	none	none	none	none
632	2.50x2	4.5x5.0	262x610	137x152	Normal	Normal	No	No	No	120 VAC 1Ph, 15 A	None	None	None	None	None	None	No	No
633	3.5x5	4x7	107x152	122x213	Normal	Normal	No	No	No	120 VAC 1Ph, 15 A	None	None	None	None	None	None	Yes	No
634	2.5x2.5	5x5	76x76	152x152	Normal	Normal	No	No	No	125 VAC 1Ph, 15 A	None	None	None	None	None	None	No	No
635	0.9x1	3x2	27x31	91x61	Normal	Normal	No	No	No	110 VAC 1Ph, 15 A	None	None	None	None	None	None	No	No
636	2x2	4x4	61x61	122x122	Normal	Normal	No	No	No	110 VAC 1Ph, 15 A	None	None	None	None	None	None	No	No
637	2x2	4x4	61x61	122x122	Normal	Normal	No	No	No	110 VAC 1Ph, 15 A	None	None	None	None	None	None	No	No

ID	Effluent Plumbing Requirements	Compressed Gases	Natural Gas used?	Flammable Compressed Gases	Special Ventilation	Operating temperatures (deg Celsius)	Sensitive to vibrations?	Noisy equipment?	Lifing Aids	Primary Work Surface	Secondary Work Surface	Equipment Rack	Storage Type	Additional Spec Sheet Available	Network Connection (Y/N)	External Dedicated Equipment (Y/N)	External Dedicated Equipment Dimensions (W x L x H inches)	External Dedicated Equipment Clearance (inches)
607	Oil Seperator	None		None	None	5C to 40C			None	None	None		None		N	N	N/A	N/A
608	None	None		None	Extraction Hood Heat/Fumes					None					Y	N	N/A	N/A
609	None	None		None	Extraction Hood Heat/Fumes					None					Y	N	N/A	N/A
610	None	None		None	Extraction Hood Heat/Fumes					None					Y	N	N/A	N/A
611	None	None		None	Extraction Hood Heat/Fumes					Standard 72" Bench					N	N	N/A	N/A
612	None	None		None	Extraction Hood Heat/Fumes					Standard 72" Bench					N	N	N/A	N/A
613	None	None		None	Extraction Hood Heat/Fumes					Standard 72" Bench					N	N	N/A	N/A
614	None	UHP Argon		None	Vacuum Exhaust					Standard 36" Bench					N	N	N/A	N/A
615	None	None	None	None	None	ambient	No	No	None	None	None	None	None	N/A	N	N	N/A	N/A
616	None	None	None	None	None	ambient	No	No	None	None	None	None	None	N/A	N	N	N/A	N/A
617	None	None	None	None	None	Ambient, Humidity < 95%	No	No	None	None	None	None	None	None	N	N	N/A	N/A
618	None	Air		Propylene	Combustion Exhaust	15C - 30C		Yes, 120 dB+		Standard 96" Bench					Y	Y	already part of column S	already part of column T
619															N	N	NA	NA
620															N	N	NA	NA
621															N	N	NA	NA
622															N	N	NA	NA
623															N	N	NA	NA
624	no	no	no	no	no		yes			table				yes	Y	Y	24x24x24	12
625									2 x 20 ton cranes to move rail car wreckage, loaded ISO Containers full of rail wreckage, etc						Y	N	NA	NA
626	Yes	none	None	None	None	ambient	None	No	None	Standard 60" bench	None	None	None	N/A	N	N	N/A	N/A
627	Yes														N	N	N/A	N/A
628	Yes	none		None	None	ambient	No	No	No	Standard 60" bench	None	None	Standard Cabinet 36" Wide	N/A	N	N	N/A	N/A
629	None	None	No	None	No	ambient	No	No		Standard 60" bench	None	None	None	N/A	N	N	N/A	N/A
630	no	none	none	none	none	ambient	no	no	no	Other (Specify)	Standard 36" bench	None	Standard Cabinet 36" Wide	N/A	N	N	N/A	N/A
631	none	Yes, Compressed Argon	None	None	None	ambient	No	No	No	Standard 36" bench	None	None	Standard Cabinet 36" Wide	N/A	N	N	N/A	N/A
632	None	None	None	None	None	Ambient	No	No	None	None	None	None	None	N/A	N	N	N/A	N/A
633	None	None	None	None	Yes	Ambient	No	No	None	Standard 72" Bench	None	None	Standard Cabinet 36" Wide	N/A	N	N	N/A	N/A
634	No	No	No	No	Yes	Ambient	No	No	None	None	None	None	None	N/A	N	N	N	N/A
635	No	No	No	No	No	Ambient	Yes	No	No	Other (Specify)	None	None	None	N/A	N	N	N	N/A
636	No	No	No	No	No	Ambient	No	No	No	Other (Specify)	None		None	N/A	N	N	N	N/A
637	No	No	No	No	No	Ambient	No	No	No	Standard 36" Bench	None		None	N/A	N	N	N	N/A

ID	REVIT Type ID	OLD Space Code (Building & Rm No.)	NEW Space Code	Name	Manufacturer (Make & Model)	Considered for Functional Program	Notes	Notes Other	Equipment height (ft)	Equipment weight (lbs)	Foot Print WxL (ft)	Ideal Area Required WxL (ft)	Footprint Metric WxL (metric)	Ideal Area Required WxL (metric)	Ideal Room Height
NEW	#N/A		3.21 or 3.22 Metallographic Sample Preparation	New microscopy equipment TBD		Yes			Not yet aquired						
NEW	#N/A		3.25 Non Destructive Evaluation	Multi-axis ultrasonic immersion system to perform inspection of complex geometry		Yes			8	50000					
NEW	#N/A		3.25 Non Destructive Evaluation	Nano computed tomography system		Yes			8	4200					
NEW	#N/A		3.9 HTM R&D Lab	Upgrade of CMC processing and characterization test equipment.		Yes			Not yet aquired						
NEW	#N/A		3.15 Burner Rig #2	Upgrade combustion burner rigs to 2200°C temperature capability for next generation high temperature materials and coatings.		Yes			Not yet aquired						
NEW	#N/A		3.5 Spin Rig	Upgrade spin test rig from compressed air drive system to more energy efficient high speed electric drive with energy recovery system.		Yes			Not yet aquired						
NEW	#N/A		1.1 NRC High bay	3D Metallic Printer (ex. Desktop metal or GE Arcam)		Yes			Not yet aquired						
	#N/A														
650	E200		3.21 Metallographic Sectioning and Specimen Extraction	X-Small Ultrasonic Cleaner		Yes		from PowerPoint - counter			3x3		915 x 915		
651	E200		3.22 Metallographic Sample Preparation	X-Small Ultrasonic Cleaner		Yes		from PowerPoint - counter			3x3		915 x 915		
652	E201		3.21 Metallographic Sectioning and Specimen Extraction	Small Ultrasonic Cleaner		Yes		from PowerPoint x2 required - counter			3x4		915 x 1220		
653	E201		3.22 Metallographic Sample Preparation	Small Ultrasonic Cleaner		Yes		from PowerPoint x2 required - counter			3x4		915 x 1220		
654	E202		3.21 Metallographic Sectioning and Specimen Extraction	Medium Ultrasonic Cleaner		Yes		from PowerPoint - counter			3x4		915 x 1220		
655	E203		3.21 Metallographic Sectioning and Specimen Extraction	Parts Cleaner - Dishwasher		Yes		from PowerPoint - floor			4x4		1220 x 1220		
656	E204		3.22 Metallographic Sample Preparation	Dishwasher for Glassware		Yes		from PowerPoint - floor			30" x 24"		762 x 610		
657	E205		3.21 Metallographic Sectioning and Specimen Extraction	Tool Box		Yes		from PowerPoint - counter			18" x 36"		460 x 915		

ID	Power Requirement (Req' more than 120V)	Fuel Consumed	Process Cooling Required	Back-up Power Required	Primary Power	Secondary Power	Tertiary Power	Quartenary Power	Additional Power	Process Cooling	City Water Backup	Compressed Air	City Water Supply	Effluent Plumbing Requirements	Compressed Gases	Natural Gas used?	Flammable Compressed Gases	Special Ventilation	Operating temperatures (deg Celsius)	Sensitive to vibrations?	Noisy equipment?	Lifing Aids	Primary Work Surface	Secondary Work Surface	Equipment Rack	Storage Type	Additional Spec Sheet Available	Network Connection (Y/N)	External Dedicated Equipment (Y/N)	External Dedicated Equipment Dimensions (W x L x H inches)	External Dedicated Equipment Clearance (inches)
NEW																															
NEW																															
NEW																															
NEW																															
NEW																												N	N		
NEW																															
NEW																															
650																															
651																															
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Appendix C **GUIDE TO SCIENCE RDS**

QUICK GUIDE TO UNDERSTANDING ROOM DATA SHEETS

THIS EXCEL DOCUMENT CONTAINS INTERACTIVE TABS THAT LINK DIRECTLY TO EACH OF THE ROOM DATASHEETS (RDS's).

RDS-001 THROUGH RDS-056 CAN BE DIRECTLY ACCESSED TO BY USING/ CLICKING ON THE RESPECTIVE ROOM NUMBER LINK FROM THE COVERSHEET TAB. (PLAN AND ISO LINKS WILL ONLY WORK FROM PDF AS INFORMATION COMES FROM REVIT)

RDS-000-INFO IS THE BLANK TEMPLATE OF THE FIRST PAGE OF ANY ROOM DATA SHEET.
THIS TAB BELONGS TO FRAMEWORK ONLY. NO CHANGE IS ALLOWED EXCEPT A PERMISSION IS GIVEN BY FW LEADS ONLY.

EQUIPMENT DATABASE CONTAINS THE BASIC DATA BASE FOR THE SECOND PAGE OF ANY ROOM DATA SHEET. THIS LIST IS BASED ON THE COMPLETE EQUIPMENT LIST FROM A SEPARATE DOCUMENT.
THIS TAB BELONGS TO FRAMEWORK ONLY. PLEASE DO NOT EDIT OR CHANGE. "WORK IN PROGRESS"

DATABASE CONTAINS THE INFORMATION FOR THE FIRST PAGE OF ANY ROOM DATA SHEET.
THIS TAB BELONGS TO FRAMEWORK ONLY. PLEASE DO NOT EDIT OR CHANGE. "WORK IN PROGRESS"

THE PURPOSE OF THE COVERSHEET TAB IS TO FACILITATE VIEWING AND ACCESS OF THE DESIRED ROOM DATA SHEET. THE COVERSHEET TAB WILL ALSO HELP THE END-USERS TO HAVE IT AS AN INDEX VIEW. IT PROVIDES INTERACTIVE HYPERLINKS THAT WILL SEND YOU TO THE SPECIFIED ROOM. INFORMATION ALSO SHOWS ROOM DATA SHEET NUMBER, PAGE DESCRIPTION, ROOM NAME, SPACE TYPE, AND ROOM DESCRIPTION.
THIS TAB BELONGS TO FRAMEWORK ONLY. PLEASE DO NOT EDIT OR CHANGE. "WORK IN PROGRESS"

GUIDE SHEET 3 WILL HELP YOU UNDERSTAND THE SECOND AND THIRD PAGES OF ANY ROOM DATA SHEET

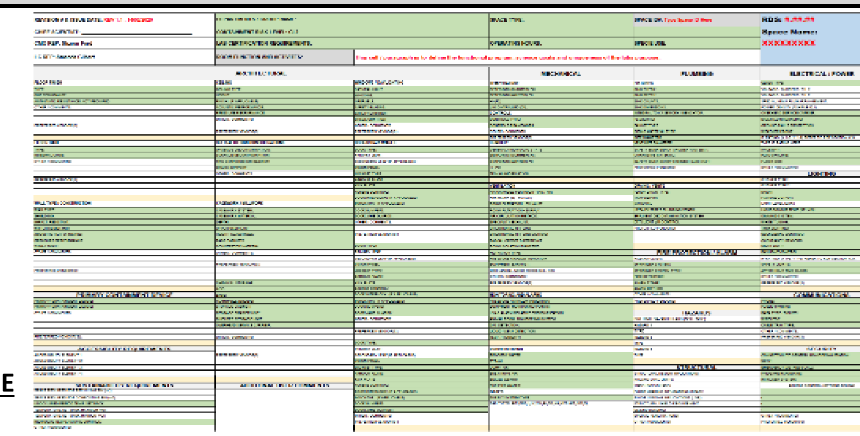
GUIDE SHEET 2 WILL HELP YOU TO UNDERSTAND THE FIRST PAGE OF ANY ROOM DATA SHEET

GUIDE SHEET 1 IS THIS PAGE. THIS SHEET WILL GIVE YOU A QUICK GUIDE TO EASILY UNDERSTAND THIS DOCUMENT.

The Room Data Sheets (RDS) for any given room consists of **three** basic page types:

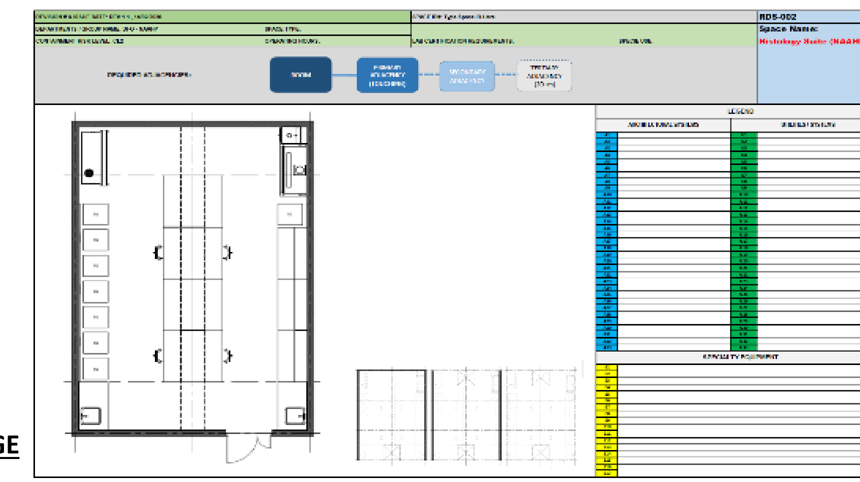
- **Page 1 of 3** provides a data summary of room information and a detailed breakdown of the various features of the space. Features of the room are organized by discipline.

PAGE



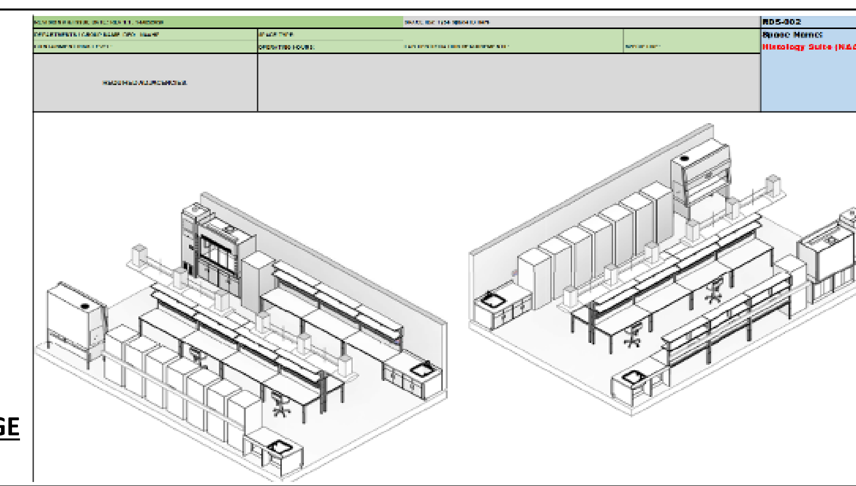
- **Page 2 of 3** includes plan of the room to illustrate where the different room elements indicated on the first page are located within the space.
- Elements can include: casework, equipment, fixtures, doors, windows and other architectural elements, specialty equipment as well as information pertaining to MEP services and utilities

PAGE



- **Page 3 of 3** provides a visual representation of 3D axonometric sections to deliver a graphical illustration summary of the room information.

PAGE



FRAMEWORK

Transportation Safety and Technology Science (TSTS)

TA 2.4.2 FUNCTIONAL PROGRAM REPORT PHASE 2 - DETAILED PROGRAMMING

DATE: 08.07.2020

VERSION: R1

RDS GUIDE-1

QUICK GUIDE TO UNDERSTANDING ROOM DATA SHEETS

FRAMEWORK WILL EDIT FIRST, USERS TO REVIEW FOR ACCURACY. IF A CELL IS HIGHLIGHTED IN PINK, THEN USERS SHOULD GIVE EXTRA ATTENTION.

- GREEN cells indicate drop down interactive menus with suggested design solutions
- RED text fields indicate key cells for inputs
- YELLOW cell Keep blank. Do Not edit
- Pink Cell users to give extra attention

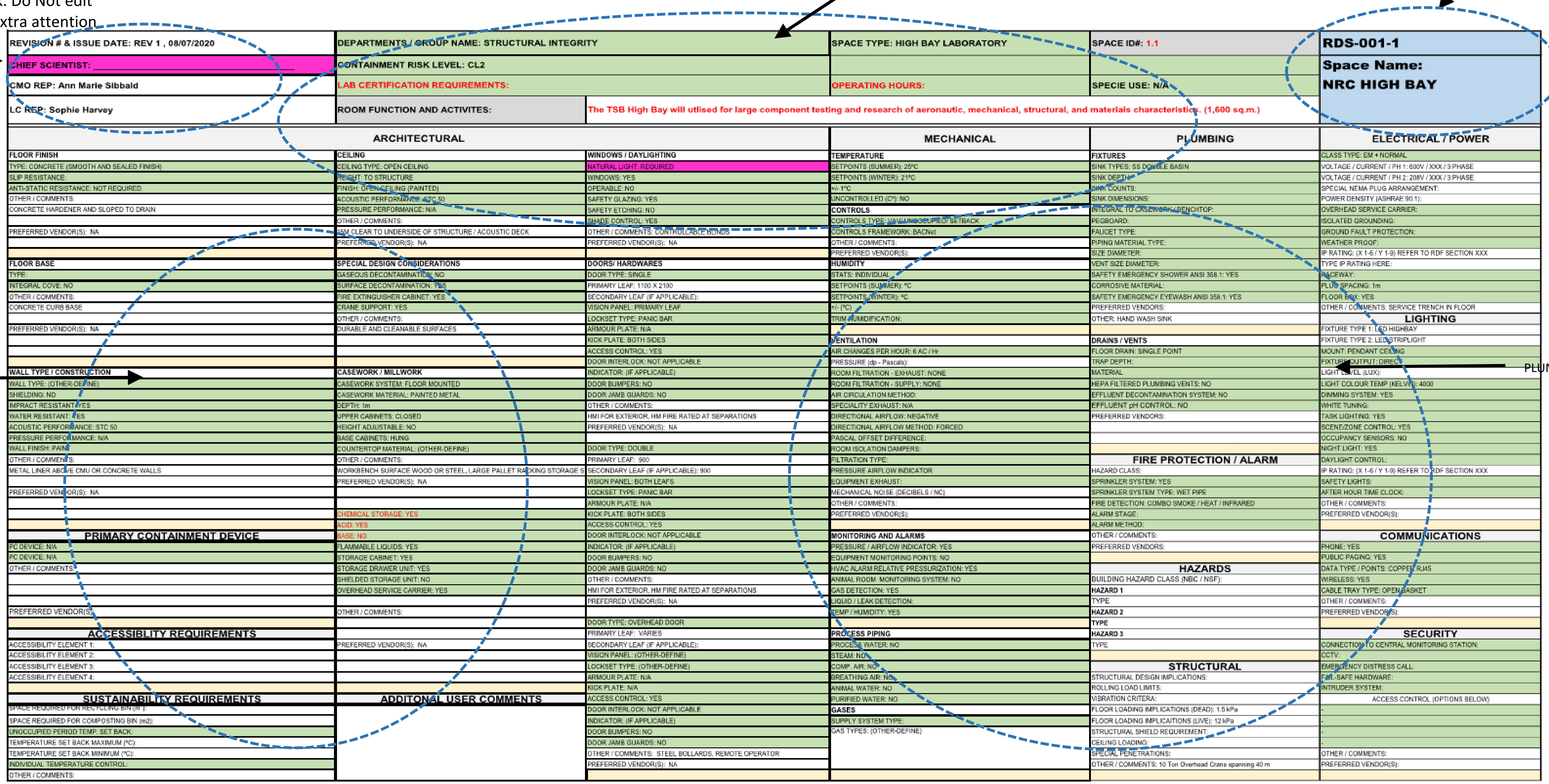
ROOM NAME / RDS NUMBER
PLEASE DO NOT CHANGE OR EDIT.

BASIC ROOM INFORMATION AND ACTIVITIES

PLEASE DO NOT CHANGE OR EDIT.

ARCHITECTURAL DATA

MECHANICAL, PLUMBING, ELECTRICAL DATA



REVISION # & ISSUE DATE: REV 1 , 08/07/2020
CHIEF SCIENTIST: ____________________
CMO REP: Ann Marie Sibbald
LC REP: Sophie Harvey

DEPARTMENTS / GROUP NAME: STRUCTURAL INTEGRITY
CONTAINMENT RISK LEVEL: CL2
LAB CERTIFICATION REQUIREMENTS:
ROOM FUNCTION AND ACTIVITES: The TSB High Bay will utlised for large component testing and research of aeronautic, mechanical, structural, and materials characteristics. (1,600 sq.m.)

SPACE TYPE: HIGH BAY LABORATORY
OPERATING HOURS:

SPACE ID#: 1.1
SPECIE USE: N/A

RDS-001-1
Space Name:
NRC HIGH BAY

ARCHITECTURAL

FLOOR FINISH
TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
SLIP RESISTANCE:
ANTI-STATIC RESISTANCE: NOT REQUIRED
OTHER / COMMENTS:
CONCRETE HARDENER AND SLOPED TO DRAIN
PREFERRED VENDOR(S): NA

FLOOR BASE
TYPE:
INTEGRAL COVE: NO
OTHER / COMMENTS:
CONCRETE CURB BASE
PREFERRED VENDOR(S): NA

WALL TYPE / CONSTRUCTION
WALL TYPE: (OTHER-DEFINE)
SHIELDING: NO
IMPRACT RESISTANT: YES
WATER RESISTANT: YES
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE: N/A
WALL FINISH: PAINT
OTHER / COMMENTS:
METAL LINER ABOVE CMU OR CONCRETE WALLS
PREFERRED VENDOR(S): NA

PRIMARY CONTAINMENT DEVICE
PC DEVICE: N/A
PC DEVICE: N/A
OTHER / COMMENTS:
PREFERRED VENDOR(S):

ACCESSIBLITY REQUIREMENTS
ACCESSIBILITY ELEMENT 1:
ACCESSIBILITY ELEMENT 2:
ACCESSIBILITY ELEMENT 3:
ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
SPACE REQUIRED FOR RECYCLING BIN (m²):
SPACE REQUIRED FOR COMPOSTING BIN (m2):
UNOCCUPIED PERIOD TEMP. SET BACK:
TEMPERATURE SET BACK MAXIMUM (°C):
TEMPERATURE SET BACK MINIMUM (°C):
INDIVIDUAL TEMPERATURE CONTROL:
OTHER / COMMENTS:

CEILING
CEILING TYPE: OPEN CEILING
HEIGHT: TO STRUCTURE
FINISH: OPEN CEILING (PAINTED)
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE: N/A
OTHER / COMMENTS:
15M CLEAR TO UNDERSIDE OF STRUCTURE / ACOUSTIC DECK
PREFERRED VENDOR(S): NA

SPECIAL DESIGN CONSIDERATIONS
GASEOUS DECONTAMINATION: NO
SURFACE DECONTAMINATION: YES
FIRE EXTINGUISHER CABINET: YES
CRANE SUPPORT: YES
OTHER / COMMENTS:
DURABLE AND CLEANABLE SURFACES

CASEWORK / MILLWORK
CASEWORK SYSTEM: FLOOR MOUNTED
CASEWORK MATERIAL: PAINTED METAL
DEPTH: 1m
UPPER CABINETS: CLOSED
HEIGHT ADJUSTABLE: NO
BASE CABINETS: HUNG
COUNTERTOP MATERIAL: (OTHER-DEFINE)
OTHER / COMMENTS:
WORKBENCH SURFACE WOOD OR STEEL, LARGE PALLET RACKING STORAGE S
PREFERRED VENDOR(S): NA
CHEMICAL STORAGE: YES
ACID: YES
BASE: NO
FLAMMABLE LIQUIDS: YES
STORAGE CABINET: YES
STORAGE DRAWER UNIT: YES
SHIELDED STORAGE UNIT: NO
OVERHEAD SERVICE CARRIER: YES
OTHER / COMMENTS:
PREFERRED VENDOR(S): NA

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
NATURAL LIGHT: REQUIRED
WINDOWS: YES
OPERABLE: NO
SAFETY GLAZING: YES
SAFETY ETCHING: NO
SHADE CONTROL: YES
OTHER / COMMENTS: CONTROLLABLE BLINDS
PREFERRED VENDOR(S): NA

DOORS/ HARDWARES
DOOR TYPE: SINGLE
PRIMARY LEAF: 1100 X 2100
SECONDARY LEAF (IF APPLICABLE):
VISION PANEL: PRIMARY LEAF
LOCKSET TYPE: PANIC BAR
ARMOUR PLATE: N/A
KICK PLATE: BOTH SIDES
ACCESS CONTROL: YES
DOOR INTERLOCK: NOT APPLICABLE
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS: NO
DOOR JAMB GUARDS: NO
OTHER / COMMENTS:
HMI FOR EXTERIOR, HM FIRE RATED AT SEPARATIONS
PREFERRED VENDOR(S): NA
DOOR TYPE: DOUBLE
PRIMARY LEAF: 900
SECONDARY LEAF (IF APPLICABLE): 900
VISION PANEL: BOTH LEAFS
LOCKSET TYPE: PANIC BAR
ARMOUR PLATE: N/A
KICK PLATE: BOTH SIDES
ACCESS CONTROL: YES
DOOR INTERLOCK: NOT APPLICABLE
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS: NO
DOOR JAMB GUARDS: NO
OTHER / COMMENTS:
HMI FOR EXTERIOR, HM FIRE RATED AT SEPARATIONS
PREFERRED VENDOR(S): NA
DOOR TYPE: OVERHEAD DOOR
PRIMARY LEAF: VARIES
SECONDARY LEAF (IF APPLICABLE):
VISION PANEL: (OTHER-DEFINE)
LOCKSET TYPE: (OTHER-DEFINE)
ARMOUR PLATE: N/A
KICK PLATE: N/A
ACCESS CONTROL: YES
DOOR INTERLOCK: NOT APPLICABLE
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS: NO
DOOR JAMB GUARDS: NO
OTHER / COMMENTS: STEEL BOLLARDS, REMOTE OPERATOR
PREFERRED VENDOR(S): NA

MECHANICAL

TEMPERATURE
SETPOINTS (SUMMER): 25°C
SETPOINTS (WINTER): 21°C
+/- 1°C
UNCONTROLLED (C°): NO

CONTROLS
CONTROLS TYPE: VAV/UNOCCUPIED/ SETBACK
CONTROLS FRAMEWORK: BACNet
OTHER / COMMENTS:
PREFERRED VENDOR(S):

HUMIDITY
STATS: INDIVIDUAL
SETPOINTS (SUMMER): °C
SETPOINTS (WINTER): °C
+/- (°C)
TRIM HUMIDIFICATION:

VENTILATION
AIR CHANGES PER HOUR: 6 AC / Hr
PRESSURE (dp - Pascals):
ROOM FILTRATION - EXHAUST: NONE
ROOM FILTRATION - SUPPLY: NONE
AIR CIRCULATION METHOD:
SPECIALITY EXHAUST: N/A
DIRECTIONAL AIRFLOW: NEGATIVE
DIRECTIONAL AIRFLOW METHOD: FORCED
PASCAL OFFSET DIFFERENCE:
ROOM ISOLATION DAMPERS:
FILTRATION TYPE:
PRESSURE AIRFLOW INDICATOR
EQUIPMENT EXHAUST:
MECHANICAL NOISE (DECIBELS / NC)
OTHER / COMMENTS:
PREFERRED VENDOR(S):

MONITORING AND ALARMS
PRESSURE / AIRFLOW INDICATOR: YES
EQUIPMENT MONITORING POINTS: NO
HVAC ALARM RELATIVE PRESSURIZATION: YES
ANIMAL ROOM MONITORING SYSTEM: NO
GAS DETECTION: YES
LIQUID / LEAK DETECTION:
TEMP / HUMIDITY: YES

PROCESS PIPING
PROCESS WATER: NO
STEAM: NO
COMP. AIR: NO
BREATHING AIR: NO
ANIMAL WATER: NO
PURIFIED WATER: NO

GASES
SUPPLY SYSTEM TYPE:
GAS TYPES: (OTHER-DEFINE)

PLUMBING

FIXTURES
SINK TYPES: SS DOUBLE BASIN
SINK DEPTH:
SINK COUNTS:
SINK DIMENSIONS:
INTEGRAL TO CASEWORK / BENCHTOP:
PEGBOARD:
FAUCET TYPE:
PIPING MATERIAL TYPE:
SIZE DIAMETER:
VENT SIZE DIAMETER:
SAFETY EMERGENCY SHOWER ANSI 358.1: YES
CORROSIVE MATERIAL:
SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
PREFERRED VENDORS:
OTHER: HAND WASH SINK

DRAINS / VENTS
FLOOR DRAIN: SINGLE POINT
TRAP DEPTH:
MATERIAL
HEPA FILTERED PLUMBING VENTS: NO
EFFLUENT DECONTAMINATION SYSTEM: NO
EFFLUENT pH CONTROL: NO
PREFERRED VENDORS:

FIRE PROTECTION / ALARM
HAZARD CLASS:
SPRINKLER SYSTEM: YES
SPRINKLER SYSTEM TYPE: WET PIPE
FIRE DETECTION: COMBO SMOKE / HEAT / INFRARED
ALARM STAGE:
ALARM METHOD:
OTHER / COMMENTS:
PREFERRED VENDORS:

HAZARDS
BUILDING HAZARD CLASS (NBC / NSF):
HAZARD 1
TYPE
HAZARD 2
TYPE
HAZARD 3
TYPE

STRUCTURAL
STRUCTURAL DESIGN IMPLICATIONS:
ROLLING LOAD LIMITS:
VIBRATION CRITERA:
FLOOR LOADING IMPLICATIONS (DEAD): 1.5 kPa
FLOOR LOADING IMPLICAITIONS (LIVE): 12 kPa
STRUCTURAL SHIELD REQUIREMENT:
CEILING LOADING:
SPECIAL PENETRATIONS:
OTHER / COMMENTS: 10 Ton Overhead Crane spanning 40 m

ELECTRICAL / POWER
CLASS TYPE: EM + NORMAL
VOLTAGE / CURRENT / PH 1: 600V / XXX / 3 PHASE
VOLTAGE / CURRENT / PH 2: 208V / XXX / 3 PHASE
SPECIAL NEMA PLUG ARRANGEMENT:
POWER DENSITY (ASHRAE 90.1):
OVERHEAD SERVICE CARRIER:
ISOLATED GROUNDING:
GROUND FAULT PROTECTION:
WEATHER PROOF:
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
TYPE IP RATING HERE:
RACEWAY:
PLUG SPACING: 1m
FLOOR BOX: YES
OTHER / COMMENTS: SERVICE TRENCH IN FLOOR

LIGHTING
FIXTURE TYPE 1: LED HIGHBAY
FIXTURE TYPE 2: LED STRIPLIGHT
MOUNT: PENDANT CEILING
FIXTURE OUTPUT: DIRECT
LIGHT LEVEL (LUX):
LIGHT COLOUR TEMP (KELVIN): 4000
DIMMING SYSTEM: YES
WHITE TUNING:
TASK LIGHTING: YES
SCENE/ZONE CONTROL: YES
OCCUPANCY SENSORS: NO
NIGHT LIGHT: YES
DAYLIGHT CONTROL:
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
SAFETY LIGHTS:
AFTER HOUR TIME CLOCK:
OTHER / COMMENTS:
PREFERRED VENDOR(S):

COMMUNICATIONS
PHONE: YES
PUBLIC PAGING: YES
DATA TYPE / POINTS: COPPER RJ45
WIRELESS: YES
CABLE TRAY TYPE: OPEN BASKET
OTHER / COMMENTS:
PREFERRED VENDOR(S):

SECURITY
CONNECTION TO CENTRAL MONITORING STATION:
CCTV:
EMERGENCY DISTRESS CALL:
FAIL-SAFE HARDWARE:
INTRUDER SYSTEM:
ACCESS CONTROL (OPTIONS BELOW)
-
-
-
-
OTHER / COMMENTS:
PREFERRED VENDOR(S):

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FRAMEWORK	Transportation Safety and Technology Science (TSTS)	DATE: 08.07.2020	RDS GUIDE-2
	TA 2.4.2 FUNCTIONAL PROGRAM REPORT PHASE 2 - DETAILED PROGRAMMING	VERSION: R1	

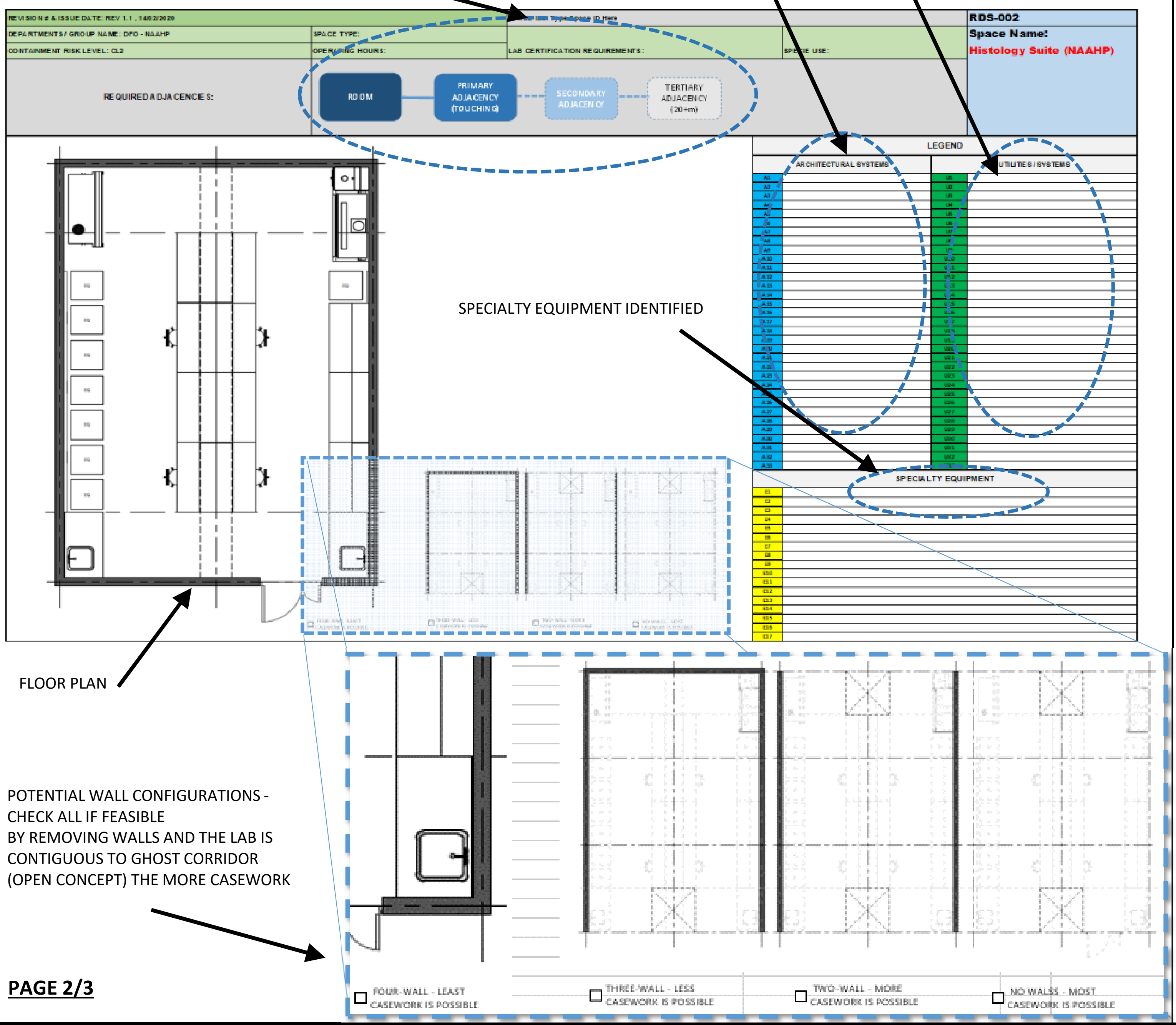
QUICK GUIDE TO UNDERSTANDING ROOM DATA SHEETS

PRIMARY, SECONDARY AND TERTIARY SPACE ADJACENCIES SHOWN - USERS TO LIST ROOM NAMES

ARCHITECTURAL SYSTEMS LEGEND

UTILITIES / SERVICES LEGEND

SPECIALTY EQUIPMENT IDENTIFIED

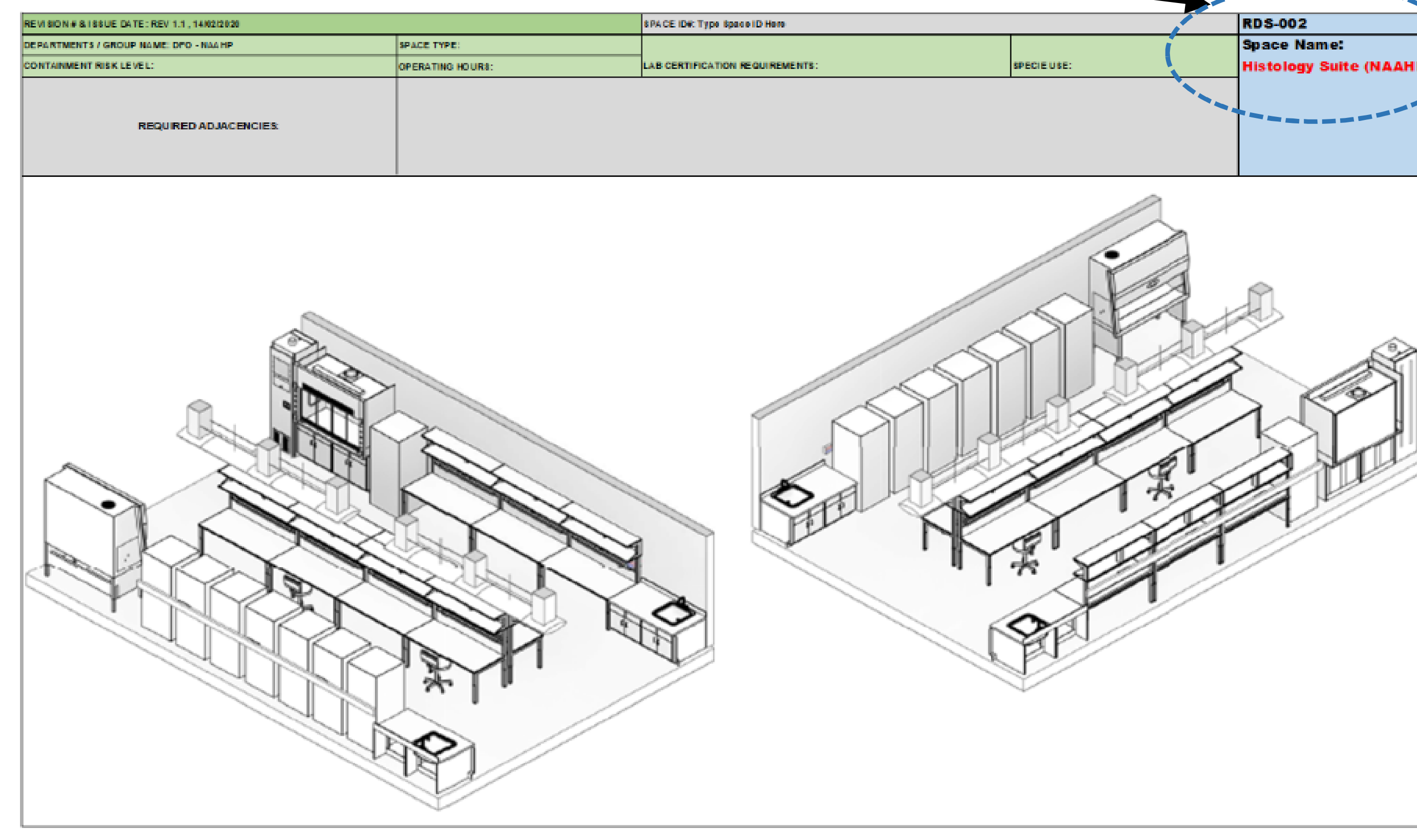


FLOOR PLAN

POTENTIAL WALL CONFIGURATIONS - CHECK ALL IF FEASIBLE
BY REMOVING WALLS AND THE LAB IS CONTIGUOUS TO GHOST CORRIDOR (OPEN CONCEPT) THE MORE CASEWORK

PAGE 2/3

ROOM NAME / RDS NUMBER
PLEASE DO NOT CHANGE OR EDIT.



3D ISOMETRIC DRAWINGS TO HELP USERS VISUALISE THE ROOMS. PLEASE NOTE THAT SOME WALLS HAVE BEEN REMOVED IN THESE DRAWINGS FOR CLARITY.

PAGE 3/3

FRAMEWORK	Transportation Safety and Technology Science (TSTS) TA 2.4.2 FUNCTIONAL PROGRAM REPORT PHASE 2 - DETAILED PROGRAMMING	DATE: 08.07.2020 VERSION: R1	RDS GUIDE-3

Appendix D GUIDE TO NON-SCIENCE RDS

QUICK GUIDE TO UNDERSTANDING ROOM DATA SHEETS

THIS EXCEL DOCUMENT CONTAINS INTERACTIVE TABS THAT LINK DIRECTLY TO EACH OF THE ROOM DATASHEETS (RDS's).

RDS-001 THROUGH RDS-056 CAN BE DIRECTLY ACCESSED TO BY USING/ CLICKING ON THE RESPECTIVE ROOM NUMBER LINK FROM THE COVERSHEET TAB. (PLAN AND ISO LINKS WILL ONLY WORK FROM PDF AS INFORMATION COMES FROM REVIT)

RDS-000-INFO IS THE BLANK TEMPLATE OF THE FIRST PAGE OF ANY ROOM DATA SHEET.
THIS TAB BELONGS TO FRAMEWORK ONLY. NO CHANGE IS ALLOWED EXCEPT A PERMISSION IS GIVEN BY FW LEADS ONLY.

EQUIPMENT DATABASE CONTAINS THE BASIC DATA BASE FOR THE SECOND PAGE OF ANY ROOM DATA SHEET. THIS LIST IS BASED ON THE COMPLETE EQUIPMENT LIST FROM A SEPARATE DOCUMENT.
THIS TAB BELONGS TO FRAMEWORK ONLY. PLEASE DO NOT EDIT OR CHANGE. "WORK IN PROGRESS"

DATABASE CONTAINS THE INFORMATION FOR THE FIRST PAGE OF ANY ROOM DATA SHEET.
THIS TAB BELONGS TO FRAMEWORK ONLY. PLEASE DO NOT EDIT OR CHANGE. "WORK IN PROGRESS"

THE PURPOSE OF THE COVERSHEET TAB IS TO FACILITATE VIEWING AND ACCESS OF THE DESIRED ROOM DATA SHEET. THE COVERSHEET TAB WILL ALSO HELP THE END-USERS TO HAVE IT AS AN INDEX VIEW. IT PROVIDES INTERACTIVE HYPERLINKS THAT WILL SEND YOU TO THE SPECIFIED ROOM. INFORMATION ALSO SHOWS ROOM DATA SHEET NUMBER, PAGE DESCRIPTION, ROOM NAME, SPACE TYPE, AND ROOM DESCRIPTION.
THIS TAB BELONGS TO FRAMEWORK ONLY. PLEASE DO NOT EDIT OR CHANGE. "WORK IN PROGRESS"

GUIDE SHEET 3 WILL HELP YOU UNDERSTAND THE SECOND AND THIRD PAGES OF ANY ROOM DATA SHEET

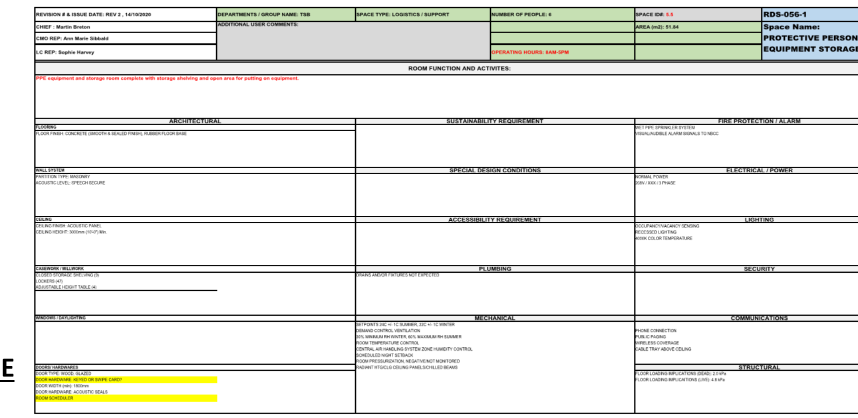
GUIDE SHEET 2 WILL HELP YOU TO UNDERSTAND THE FIRST PAGE OF ANY ROOM DATA SHEET

GUIDE SHEET 1 IS THIS PAGE. THIS SHEET WILL GIVE YOU A QUICK GUIDE TO EASILY UNDERSTAND THIS DOCUMENT.

The Room Data Sheets (RDS) for any given room consists of **three** basic page types:

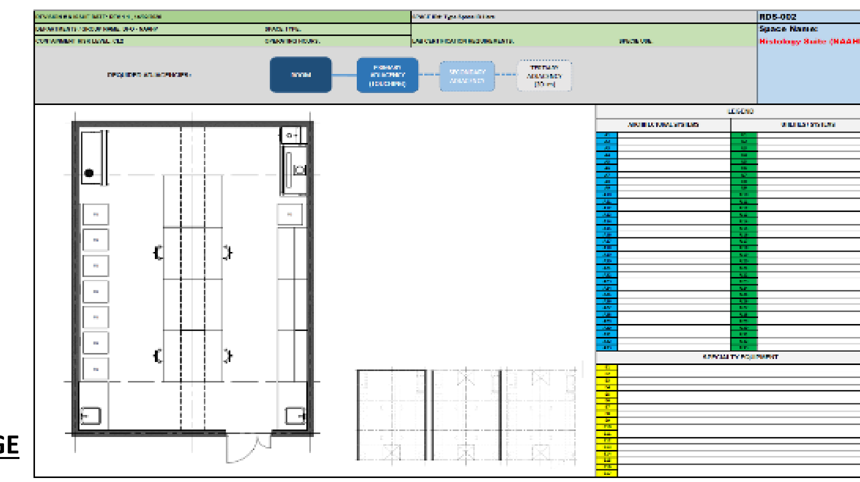
- **Page 1 of 3** provides a data summary of room information and a detailed breakdown of the various features of the space. Features of the room are organized by discipline.

PAGE



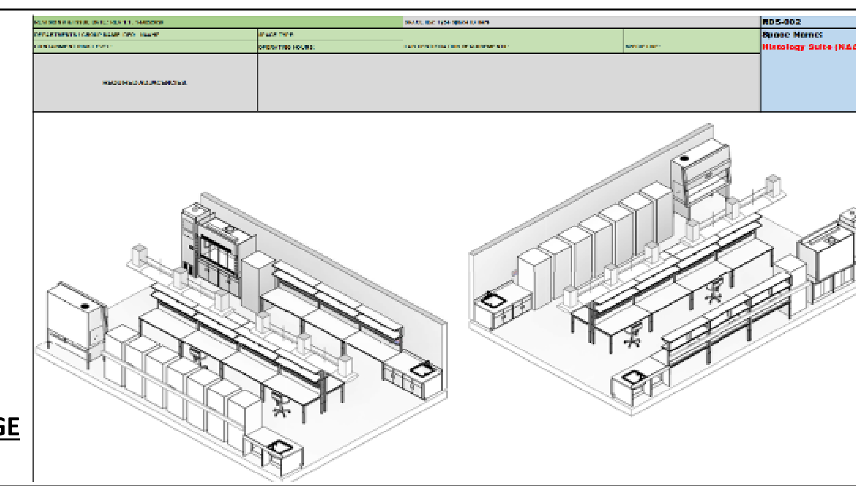
- **Page 2 of 3** includes plan of the room to illustrate where the different room elements indicated on the first page are located within the space.
- Elements can include: casework, equipment, fixtures, doors, windows and other architectural elements, specialty equipment as well as information pertaining to MEP services and utilities

PAGE



- **Page 3 of 3** provides a visual representation of 3D axonometric sections to deliver a graphical illustration summary of the room information.

PAGE



FRAMEWORK		Transportation Safety and Technology Science (TSTS) TA 2.4.2 FUNCTIONAL PROGRAM REPORT PHASE 2 - DETAILED PROGRAMMING	DATE: 08.07.2020 VERSION: R1

RDS GUIDE-1

QUICK GUIDE TO UNDERSTANDING ROOM DATA SHEETS

ROOM NAME / RDS NUMBER
PLEASE DO NOT CHANGE OR EDIT.

BASIC ROOM INFORMATION AND ACTIVITIES

PLEASE DO NOT CHANGE OR EDIT.

REVISION # & ISSUE DATE: REV 2 , 14/10/2020	DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LOGISTICS / SUPPORT	NUMBER OF PEOPLE: 6	SPACE ID#: 5.5	RDS-056-1
CHIEF : Martin Breton	ADDITIONAL USER COMMENTS:			AREA (m2): 51.84	Space Name: PROTECTIVE PERSONAL EQUIPMENT STORAGE
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			OPERATING HOURS: 8AM-5PM		

ROOM FUNCTION AND ACTIVITES:

PPE equipment and storage room complete with storage shelving and open area for putting on equipment.

ARCHITECTURAL DATA

MECHANICAL, PLUMBING, ELECTRICAL DATA

ARCHITECTURAL	SUSTAINABILITY REQUIREMENT	FIRE PROTECTION / ALARM
FLOORING FLOOR FINISH: CONCRETE (SMOOTH & SEALED FINISH), RUBBER FLOOR BASE		WET PIPE SPRINKLER SYSTEM VISUAL/AUDIBLE ALARM SIGNALS TO NBCC
WALL SYSTEM	SPECIAL DESIGN CONDITIONS	ELECTRICAL / POWER
PARTITION TYPE: MASONRY ACOUSTIC LEVEL: SPEECH SECURE		NORMAL POWER 208V / XXX / 3 PHASE
CEILING	ACCESSIBILITY REQUIREMENT	LIGHTING
CEILING FINISH: ACOUSTIC PANEL CEILING HEIGHT: 3000mm (10'-0") Min.		OCCUPANCY/VACANCY SENSING RECESSED LIGHTING 4000K COLOR TEMPERATURE
CASEWORK / MILLWORK	PLUMBING	SECURITY
CLOSED STORAGE SHELVING (9) LOCKERS (47) ADJUSTABLE HEIGHT TABLE (4)	DRAINS AND/OR FIXTURES NOT EXPECTED	
WINDOWS / DAYLIGHTING	MECHANICAL	COMMUNICATIONS
	SETPOINTS 24C +/- 1C SUMMER, 22C +/- 1C WINTER DEMAND CONTROL VENTILATION 30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER ROOM TEMPERATURE CONTROL CENTRAL AIR HANDLING SYSTEM ZONE HUMIDITY CONTROL SCHEDULED NIGHT SETBACK ROOM PRESSURIZATION, NEGATIVE/NOT MONITORED RADIANT HTG/CLG CEILING PANELS/CHILLED BEAMS	PHONE CONNECTION PUBLIC PAGING WIRELESS COVERAGE CABLE TRAY ABOVE CEILING
DOORS/ HARDWARES		STRUCTURAL
DOOR TYPE: WOOD, GLAZED DOOR HARDWARE: KEYED OR SWIPE CARD? DOOR WIDTH (min): 1800mm DOOR HARDWARE: ACOUSTIC SEALS ROOM SCHEDULER		FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa

PAGE 1/3

QUICK GUIDE TO UNDERSTANDING ROOM DATA SHEETS

PRIMARY, SECONDARY AND TERTIARY SPACE ADJACENCIES SHOWN - USERS TO LIST ROOM NAMES

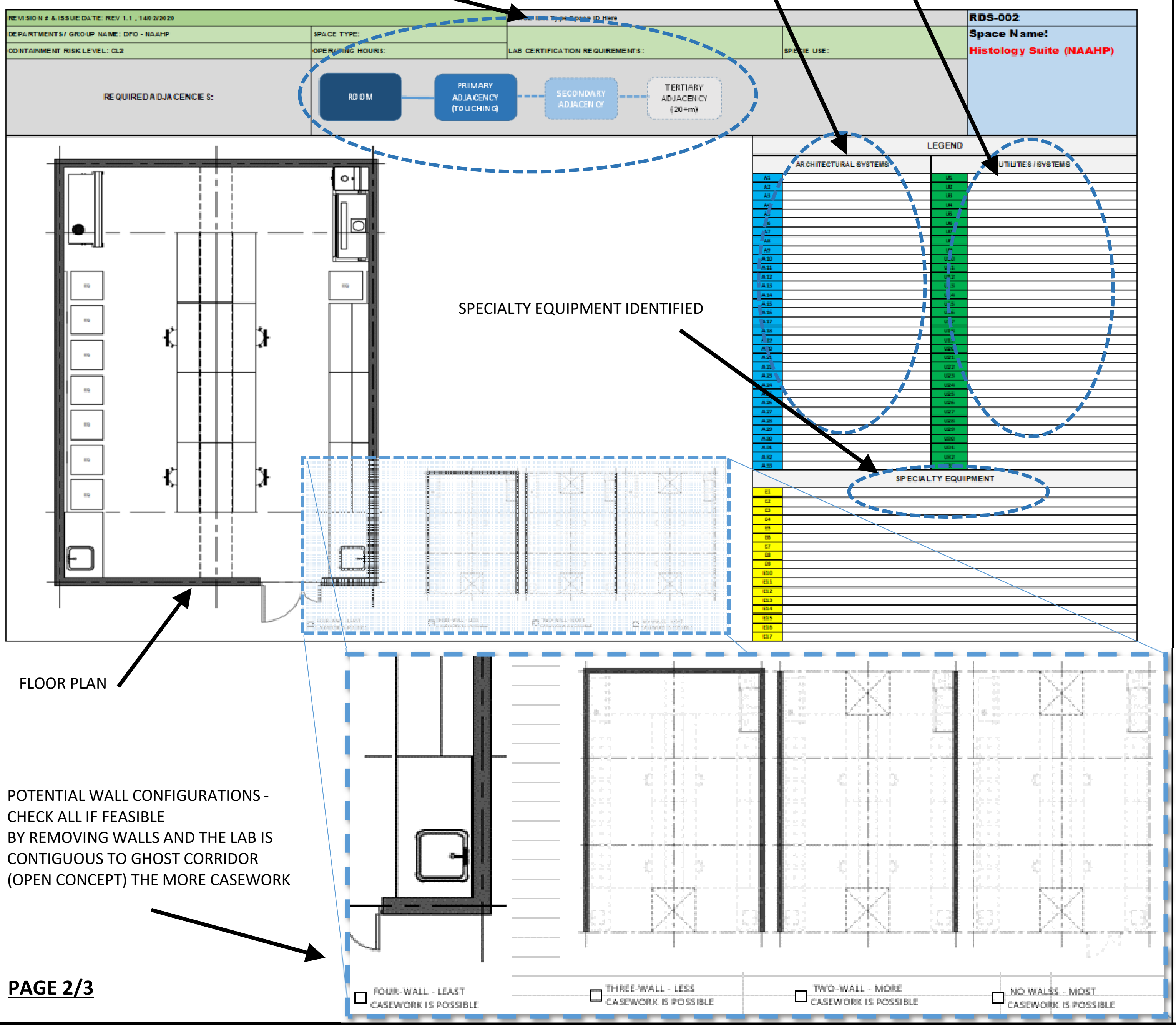
ARCHITECTURAL SYSTEMS LEGEND

UTILITIES / SERVICES LEGEND

SPECIALTY EQUIPMENT IDENTIFIED

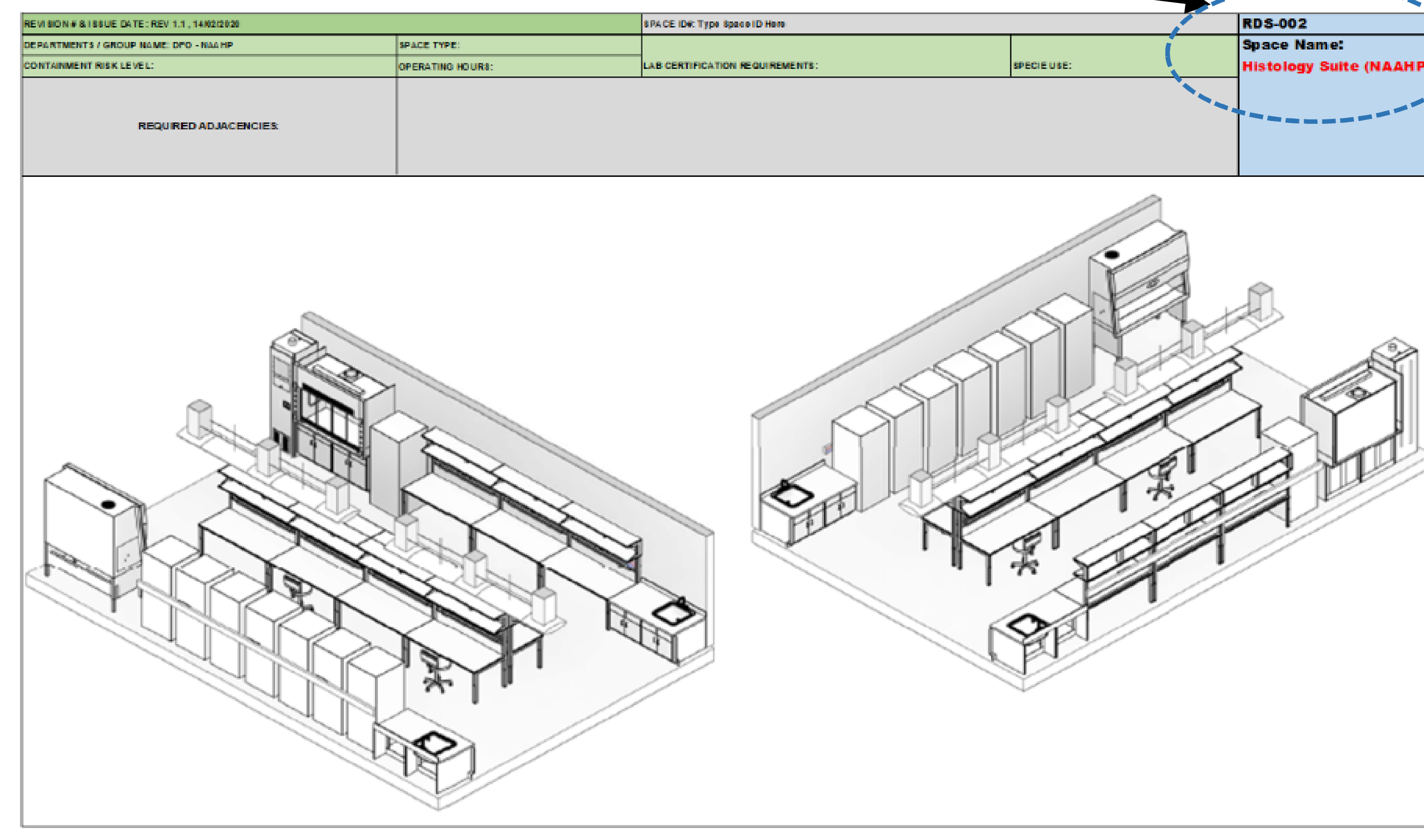
FLOOR PLAN

POTENTIAL WALL CONFIGURATIONS - CHECK ALL IF FEASIBLE
BY REMOVING WALLS AND THE LAB IS CONTIGUOUS TO GHOST CORRIDOR (OPEN CONCEPT) THE MORE CASEWORK



PAGE 2/3

ROOM NAME / RDS NUMBER
PLEASE DO NOT CHANGE OR EDIT.



3D ISOMETRIC DRAWINGS TO HELP USERS VISUALISE THE ROOMS. PLEASE NOTE THAT SOME WALLS HAVE BEEN REMOVED IN THESE DRAWINGS FOR CLARITY.

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Appendix E DRAFT ROOM DATA SHEETS

FRAMEWORK

LABS CANADA - ROOM DATA SHEET

Space ID #	Key	Description	Space Identification/Rm Name	Departments / Group Name	Space Type
	Cover Sheet				
	RDS-101-2 RDS-101-3	PLAN ISOMETRIC	TSTS METALLOGRAPHIC & CHEM LAB SUITE	TSTS Hub	
	RDS-102-2	PLAN & ISO	TSTS SEM LABORATORY	TSTS Hub	
	RDS-103-2	PLAN & ISO	SPIN RIG SUITE	NRC	
	RDS-104-2	PLAN & ISO	BURNER RIG SUITE	NRC	
	RDS-105-2	PLAN & ISO	HIP AND TGST SUITE	NRC	
1.1	RDS-001-1 RDS-001-2 RDS-001-3	INFO PLAN ISOMETRIC	NRC HIGH BAY	NRC	HIGH BAY LABORATORY
1.2	RDS-002-1 RDS-002-2 RDS-002-3	INFO PLAN ISOMETRIC	TSB HIGH BAY	TSB	HIGH BAY LABORATORY
2.1	RDS-003-1 RDS-003-2 RDS-003-3	INFO PLAN ISOMETRIC	TEAR DOWN WORKSHOP	TSB	WORKSHOP
2.2	RDS-004-1 RDS-004-2 RDS-004-3	INFO PLAN ISOMETRIC	MATERIAL TESTING PREP SHOP	TSTS Hub	WORKSHOP
2.3	RDS-005-1 RDS-005-2 RDS-005-3	INFO PLAN ISOMETRIC	INSTRUMENTATION WORKSHOP	TSTS Hub	WORKSHOP
2.4	RDS-006-1 RDS-006-2 RDS-006-3	INFO PLAN ISOMETRIC	WOOD WORKSHOP	TSTS Hub	WORKSHOP
2.5	RDS-007-1 RDS-007-2 RDS-007-3	INFO PLAN ISOMETRIC	MACHINE WORKSHOP	TSTS Hub	WORKSHOP
2.6	RDS-008-1 RDS-008-2 RDS-008-3	INFO PLAN ISOMETRIC	WELDING WORKSHOP	TSTS Hub	WORKSHOP
3.1	RDS-009-1 RDS-009-2 RDS-009-3	INFO PLAN ISOMETRIC	PHOTO LAB	TSB	LABORATORY
3.2	RDS-010-1 RDS-010-2 RDS-010-3	INFO PLAN ISOMETRIC	CHEMICAL LAB	TSTS Hub	LABORATORY
3.3	RDS-011-1 RDS-011-2 RDS-011-3	INFO PLAN ISOMETRIC	FLIGHT RECORDER + NVM	TSB	LABORATORY
3.3A	RDS-011 A-1	INFO	DISASSEMBLY	TSB	LABORATORY
3.3B	RDS-011 B-1	INFO	STORAGE	TSB	LABORATORY
3.3C	RDS-011 C-1	INFO	CVR / FDR COLLABORATION ROOM	TSB	LABORATORY
3.3D	RDS-011 D-1	INFO	AUDIO BOOTH	TSB	LABORATORY

3.4	RDS-012-1 RDS-012-2 RDS-012-3	INFO PLAN ISOMETRIC	AVIONICS LAB	TSB	LABORATORY
3.5	RDS-013-1 RDS-013-2 RDS-013-3	INFO PLAN ISOMETRIC	SPIN RIG	NRC	LABORATORY
3.6	RDS-014-1 RDS-014-2 RDS-014-3	INFO PLAN ISOMETRIC	CONTROL ROOM SPIN RIG	NRC	LABORATORY
3.7	RDS-015-1 RDS-015-2 RDS-015-3	INFO PLAN ISOMETRIC	SPIN RIG PREP ROOM	NRC	LABORATORY
3.8	RDS-016-1 RDS-016-2 RDS-016-3	INFO PLAN ISOMETRIC	TGST RIG	NRC	LABORATORY
3.9	RDS-017-1 RDS-017-2 RDS-017-3	INFO PLAN ISOMETRIC	HTM R&D LAB	NRC	LABORATORY
3.10	RDS-018-1 RDS-018-2 RDS-018-3	INFO PLAN ISOMETRIC	HOT ISOSTATIC PRESS	MRC	LABORATORY
3.11	RDS-019-1 RDS-019-2 RDS-019-3	INFO PLAN ISOMETRIC	CONTROL ROOM HOT ISO PRESS & TGST RIG	NRC	LABORATORY
3.12	RDS-020-1 RDS-020-2 RDS-020-3	INFO PLAN ISOMETRIC	HTM PREP ROOM	NRC	LABORATORY
3.13	RDS-021-1 RDS-021-2 RDS-021-3	INFO PLAN ISOMETRIC	BURNER RIG CONTROL ROOM	NRC	LABORATORY
3.14	RDS-022-1 RDS-022-2 RDS-022-3	INFO PLAN ISOMETRIC	BURNER RIG #1	NRC	LABORATORY
3.15	RDS-023-1 RDS-023-2 RDS-023-3	INFO PLAN ISOMETRIC	BURNER RIG #2	NRC	LABORATORY
3.16	RDS-024-1 RDS-024-2 RDS-024-3	INFO PLAN ISOMETRIC	FULL SCALE TESTING PREP ROOM	NRC	LABORATORY
3.17	RDS-025-1 RDS-025-2 RDS-025-3	INFO PLAN ISOMETRIC	HEAT TREATMENT AND COATING LAB	NRC	LABORATORY
3.18	RDS-026-1 RDS-026-2 RDS-026-3	INFO PLAN ISOMETRIC	FULL SCALE TESTING CONTROL ROOM	NRC	LABORATORY

3.19A	RDS-027A-1 RDS-027A-2 RDS-027A-3	INFO PLAN ISOMETRIC	SEM LAB - A	TSTS Hub	LABORATORY
3.19B	RDS-027B-1 RDS-027B-2 RDS-027B-3	INFO PLAN ISOMETRIC	SEM LAB - B	TSTS Hub	LABORATORY
3.20	RDS-028-1 RDS-028-2 RDS-028-3	INFO PLAN ISOMETRIC	MICROSCOPE LAB	TSTS Hub	LABORATORY
3.21	RDS-029-1 RDS-029-2 RDS-029-3	INFO PLAN ISOMETRIC	METALLOGRAPHIC SECTIONING SPECIMEN EXTRACTION	TSTS Hub	LABORATORY
3.22	RDS-030-1 RDS-030-2 RDS-030-3	INFO PLAN ISOMETRIC	METALLOGRAPHIC SAMPLE PREPARATION	TSTS Hub	LABORATORY
3.23	RDS-031-1 RDS-031-2 RDS-031-3	INFO PLAN ISOMETRIC	MATERIAL AND COMPONENT TESTING	TSTS Hub	LABORATORY
3.24	RDS-032-1 RDS-032-2 RDS-032-3	INFO PLAN ISOMETRIC	EXPERIMENTAL MECHANICS LAB	NRC	LABORATORY
3.25	RDS-033-1 RDS-033-2 RDS-033-3	INFO PLAN ISOMETRIC	NON DESTRUCTIVE EVALUATION	TSTS Hub	LABORATORY
3.26	RDS-034-1 RDS-034-2 RDS-034-3	INFO PLAN ISOMETRIC	PHYSICAL AND FRACTO ANALYSIS ROOM	TSTS Hub	LABORATORY
3.27	RDS-035-1 RDS-035-2 RDS-035-3	INFO PLAN ISOMETRIC	MATERIAL TESTING AND EVALUATION	TSTS Hub	LABORATORY
4.1	RDS-036-1 RDS-036-2 RDS-036-3	INFO PLAN ISOMETRIC	SPIN AND BURNER RIG EQUIPMENT SUPPORT	NRC	LABORATORY SUPPORT
4.2	RDS-037-1 RDS-037-2 RDS-037-3	INFO PLAN ISOMETRIC	PUMP ROOM	NRC	LABORATORY SUPPORT
4.3	RDS-038-1 RDS-038-2 RDS-038-3	INFO PLAN ISOMETRIC	SEM LAB SUPPORT ROOM	TSTS Hub	LABORATORY SUPPORT
4.4	RDS-039-1 RDS-039-1 RDS-039-2	INFO PLAN ISOMETRIC	BATTERY STORAGE ROOM	TSB	LABORATORY SUPPORT
4.5	RDS-040-1 RDS-040-2 RDS-040-3	INFO PLAN ISOMETRIC	WRECKAGE STORAGE	TSB	LABORATORY SUPPORT

4.6	RDS-041-1 RDS-041-2 RDS-041-3	INFO PLAN ISOMETRIC	FULL SCALE TESTING EQUIPMENT STORAGE	NRC	LABORATORY SUPPORT
4.7	RDS-042-1 RDS-042-2 RDS-042-3	INFO PLAN ISOMETRIC	NDE EQUIPMENT STORAGE	TSTS Hub	LABORATORY SUPPORT
4.8	RDS-043-1 RDS-043-2 RDS-043-3	INFO PLAN ISOMETRIC	MATERIAL TESTING EQUIPMENT STORAGE	TSTS Hub	LABORATORY SUPPORT
4.9	RDS-044-1 RDS-044-2 RDS-044-3	INFO PLAN ISOMETRIC	HTM TESTING EQUIPMENT STORAGE	NRC	LABORATORY SUPPORT
4.11	RDS-046-1 RDS-046-2 RDS-046-3	INFO PLAN ISOMETRIC	GAS CYLINDER STORAGE	TSTS Hub	LABORATORY SUPPORT
4.12	RDS-047-1 RDS-047-2 RDS-047-3	INFO PLAN ISOMETRIC	OIL STORAGE ROOM	TSTS Hub	LABORATORY SUPPORT
4.13	RDS-048-1 RDS-048-2 RDS-048-3	INFO PLAN ISOMETRIC	BURNER RIG STORAGE	NRC	LABORATORY SUPPORT
4.14	RDS-049-1 RDS-049-2 RDS-049-3	INFO PLAN ISOMETRIC	SECURED STORAGE FOR CONTROL GOODS	NRC	LABORATORY SUPPORT
4.15	RDS-050-1 RDS-050-3 RDS-050-3	INFO PLAN ISOMETRIC	MACHINE SHOP TOOL ROOM	TSTS Hub	LABORATORY SUPPORT
4.16	RDS-051-1 RDS-051-2 RDS-051-3	INFO PLAN ISOMETRIC	SEM PREP ROOM	TSTS Hub	LABORATORY SUPPORT
5.1	RDS-052-1 RDS-052-2 RDS-052-3	INFO PLAN ISOMETRIC	TSTS SHIPPING AND RECEIVING	TSTS Hub	LOGISTICS/ SUPPORT
5.4	RDS-055-1 RDS-055-2 RDS-055-3	INFO PLAN ISOMETRIC	UNIVERSAL LOCKER ROOM & CLEAN ROOM	TSB	LOGISTICS/ SUPPORT
5.5	RDS-056-1 RDS-056-2 RDS-056-3	INFO PLAN ISOMETRIC	PROTECTIVE PERSONAL EQUIPMENT STORAGE	TSB	LOGISTICS/ SUPPORT
6.1	RDS-057-1 RDS-057-2 RDS-057-3	INFO PLAN ISOMETRIC	OFFICE OF THE CHAIR (DM)	TSB HO	ADMIN
6.2	RDS-058-1 RDS-058-2 RDS-058-3	INFO PLAN ISOMETRIC	MEMBERS OF BOARD OFFICES	TSB HO	ADMIN

10.1	RDS-076-1 RDS-076-2 RDS-076-3	INFO PLAN ISOMETRIC	RECORDS / FILING	TSB HO	ADMIN SPS
10.2	RDS-077-1 RDS-077-2 RDS-077-3	INFO PLAN ISOMETRIC	SPECIAL CLOTHING EQUIPMENT STORAGE	TSB HO	ADMIN SPS
10.3	RDS-078-1 RDS-078-2 RDS-078-3	INFO PLAN ISOMETRIC	IT EQUIPMENT STORAGE	TSB HO	ADMIN SPS
10.4	RDS-079-1 RDS-079-2 RDS-079-3	INFO PLAN ISOMETRIC	MEDIA STORAGE	TSB HO	ADMIN SPS
10.5	RDS-080-1 RDS-080-2 RDS-080-3	INFO PLAN ISOMETRIC	ADMINISTRATIVE EQUIPMENT STORAGE	TSB HO	ADMIN SPS
10.7	RDS-082-1 RDS-082-2 RDS-082-3	INFO PLAN ISOMETRIC	TELECOM AND SERVER ROOM	TSB HO	ADMIN SPS
10.9	RDS-084-1 RDS-084-2 RDS-084-3	INFO PLAN ISOMETRIC	TRAINING EQUIPMENT STORAGE	TSB HO	ADMIN SPS
11.1	RDS-089-1 RDS-089-2 RDS-089-3	INFO PLAN ISOMETRIC	SECURITY AREA	TSB HO & TSTS Hub	PUBLIC
12.1	RDS-090-1 RDS-090-2 RDS-090-3	INFO PLAN ISOMETRIC	AUDITORIUM	TSTS Hub	SHARED SPACE
12.2	RDS-091-1 RDS-091-2 RDS-091-3	INFO PLAN ISOMETRIC	RESOURCE CENTRE	TSB HO & TSTS Hub	SHARED SPACE
13.1	RDS-095-1 RDS-095-2	INFO PLAN	COVERED STORAGE	NRC	OUTDOOR YARD

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #:		**RDS: 101-2**
DEPARTMENTS / GROUP NAME:	SPACE TYPE:			**SPACE NAME:** **TSTS METALLOGRAPHIC & CHEM LAB SUITE**
CONTAINMENT RISK LEVEL:	OPERATING HOURS:	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			

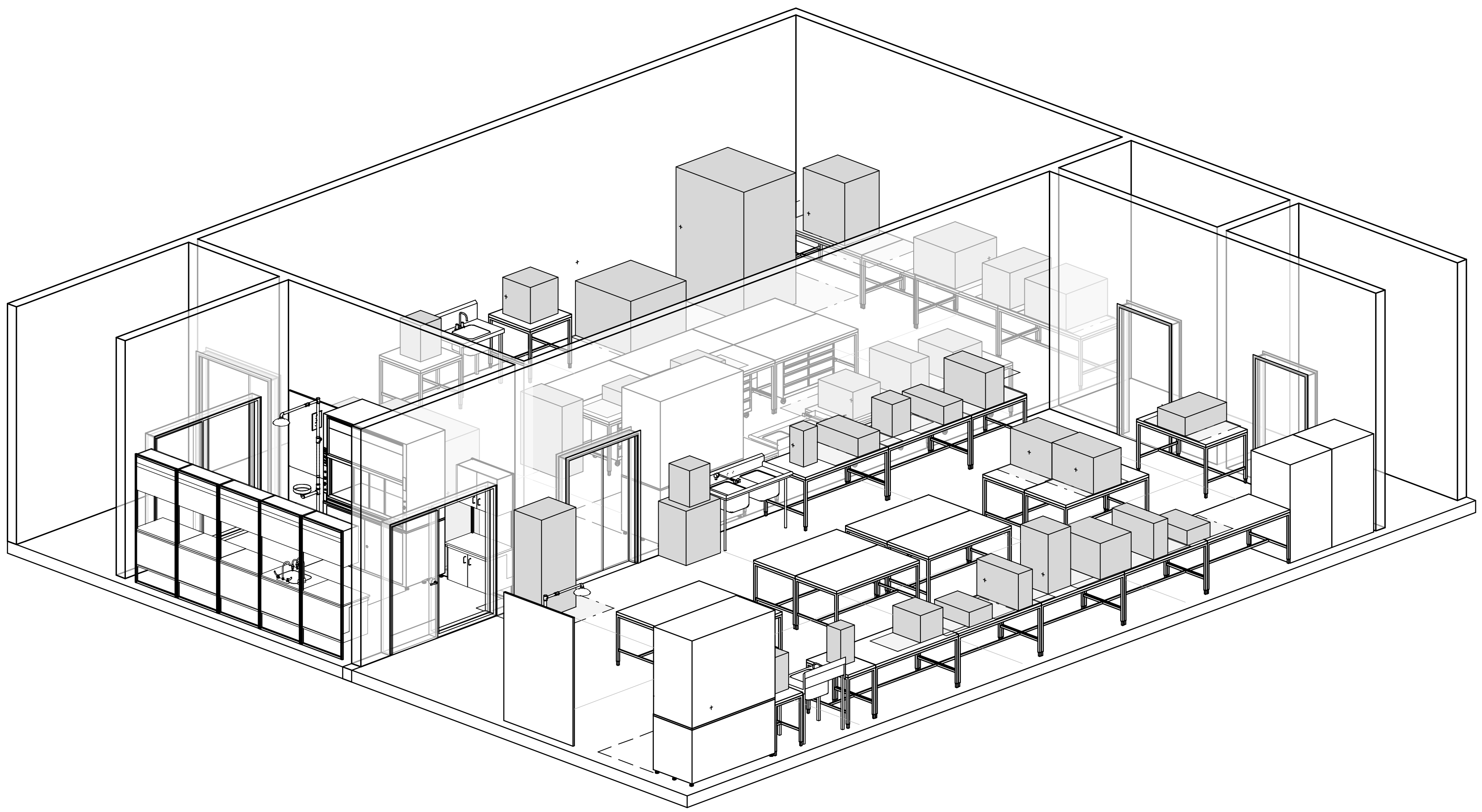
FOR INDIVIDUAL ROOMS REFER TO RDS-010, RDS-029 AND RDS-030.

1
101-2

TSTS METALLOGRAPHIC & CHEM LAB SUITE

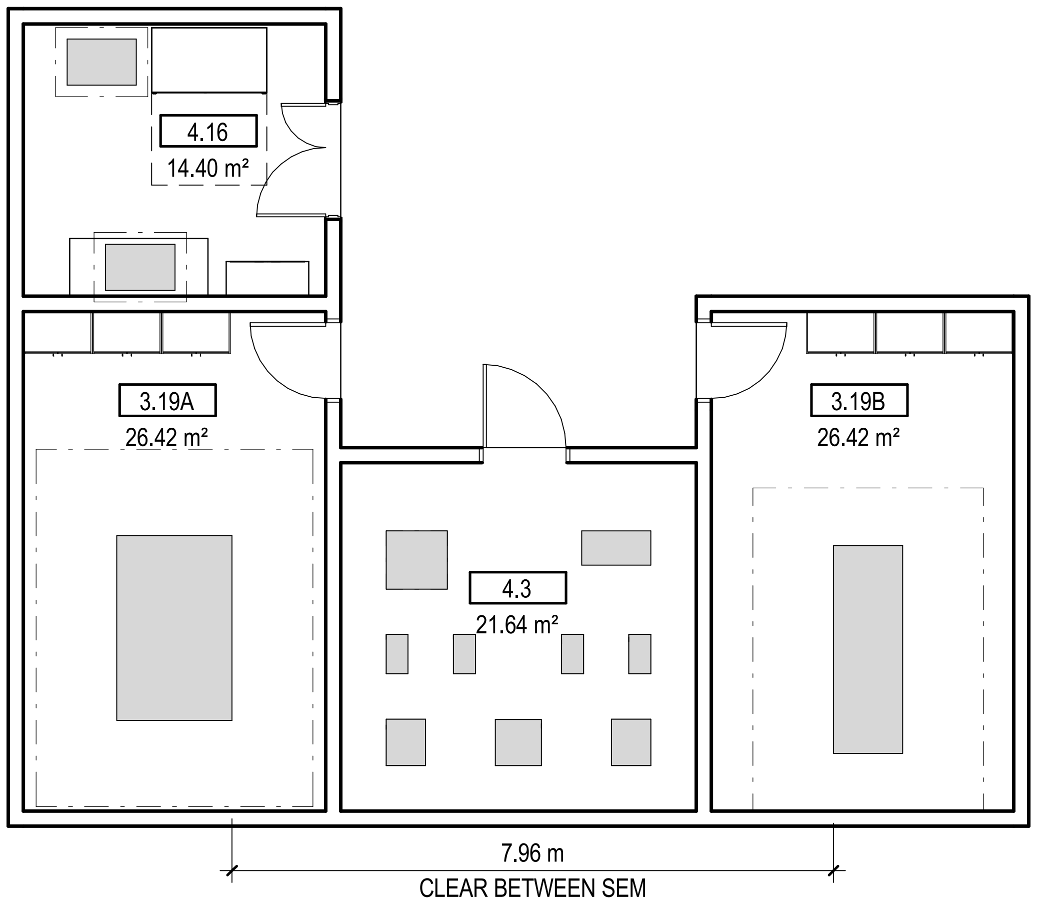
1 : 100

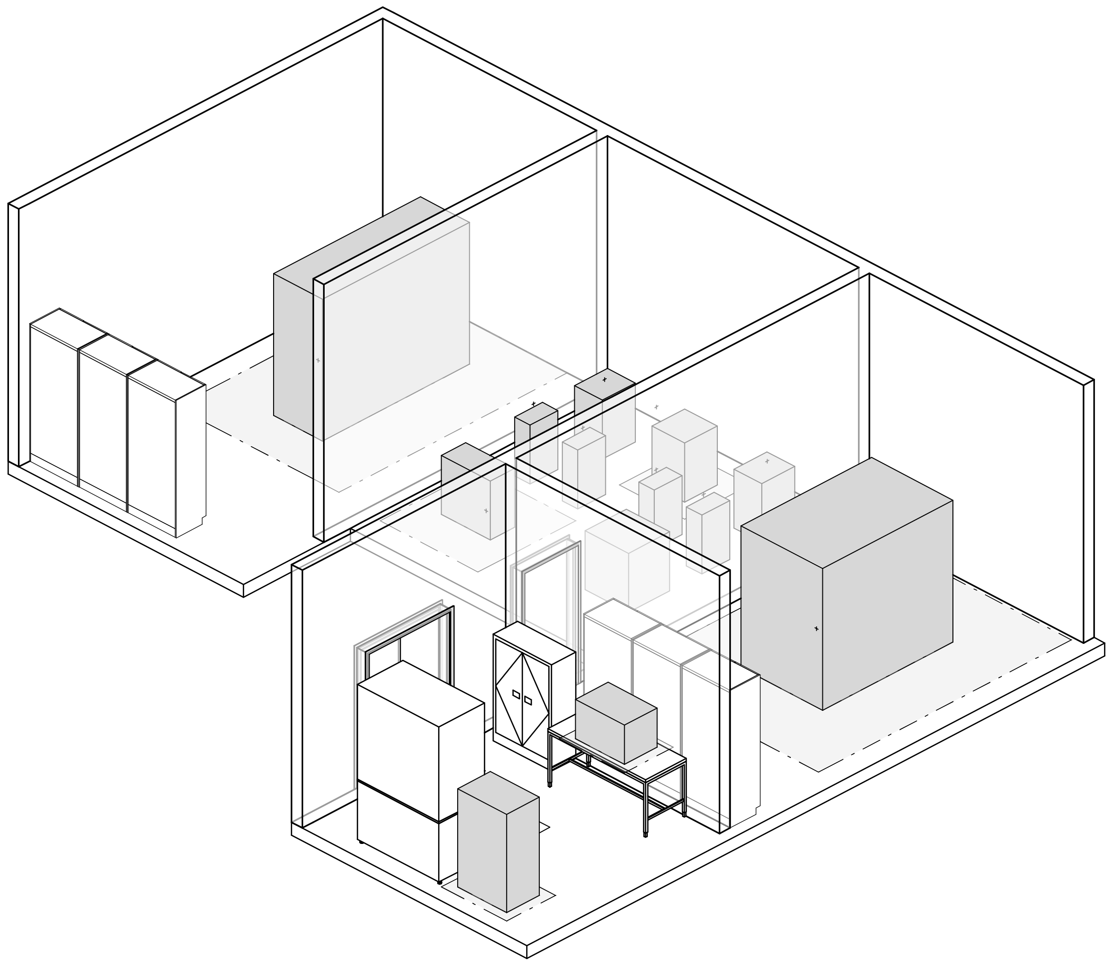
REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #:		**RDS: 101-3**
DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY			**SPACE NAME: TSTS METALLOGRAPHIC & CHEM LAB SUITE**
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			



REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #:		RDS: 102-2
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:		SPACE NAME: TSTS SEM LABORATORY SUITE
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 7AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			

FOR INDIVIDUAL ROOMS REFER TO RDS-027A, RDS-027B, RDS-038 AND RDS-051.

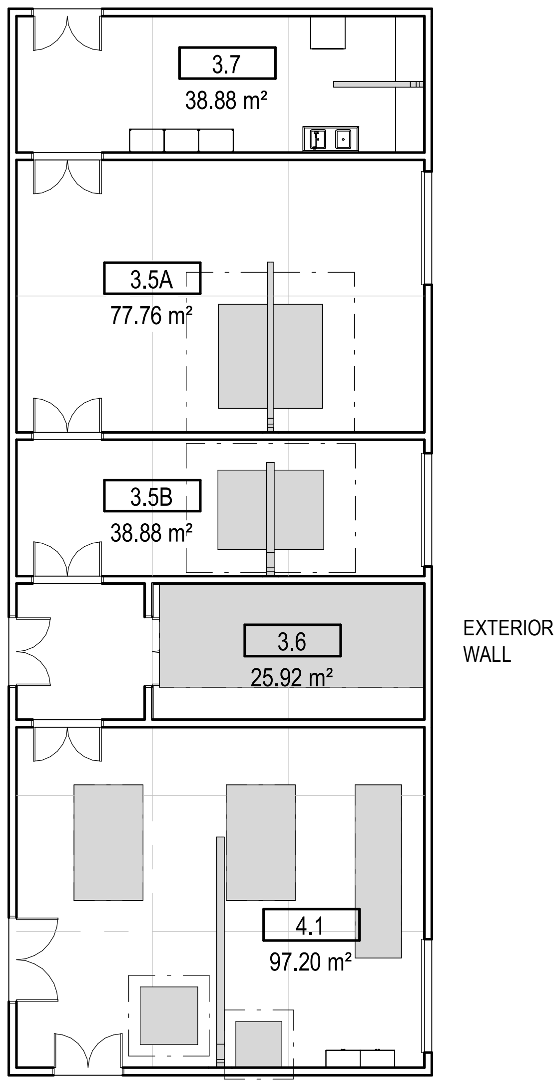


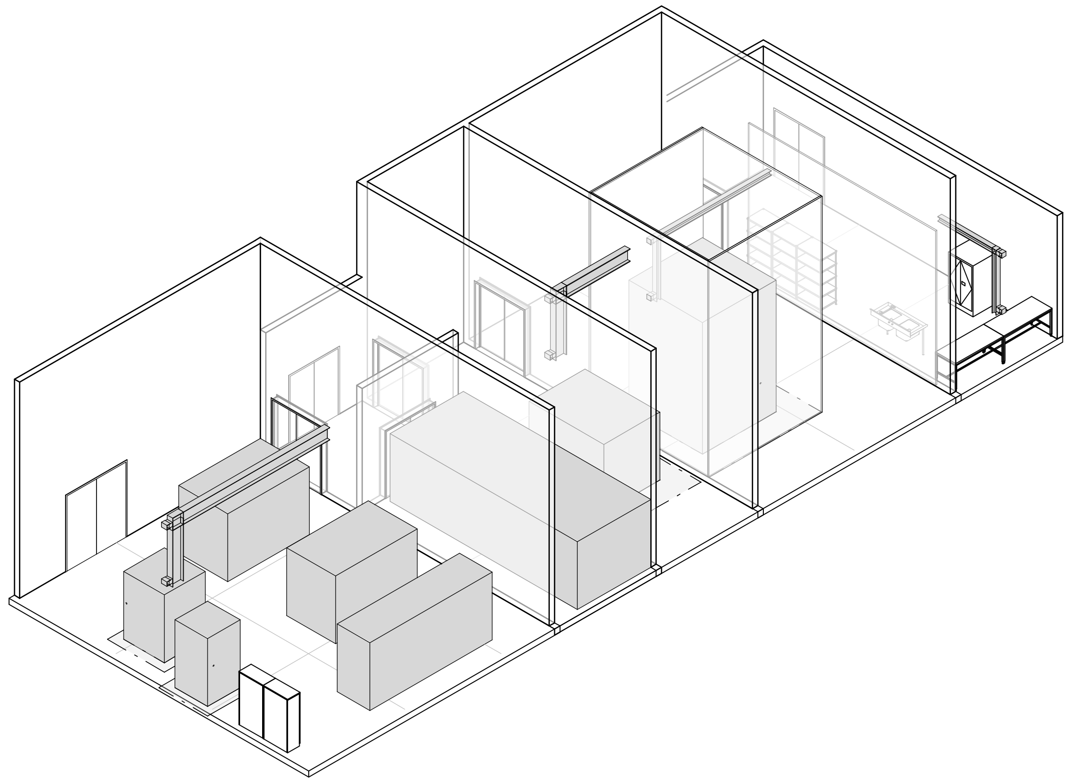


1
102-2
TSTS SEM LABORATORY SUITE
1 : 100

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #:		**RDS: 103-2**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY			**SPACE NAME: SPIN RIG SUITE**
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			

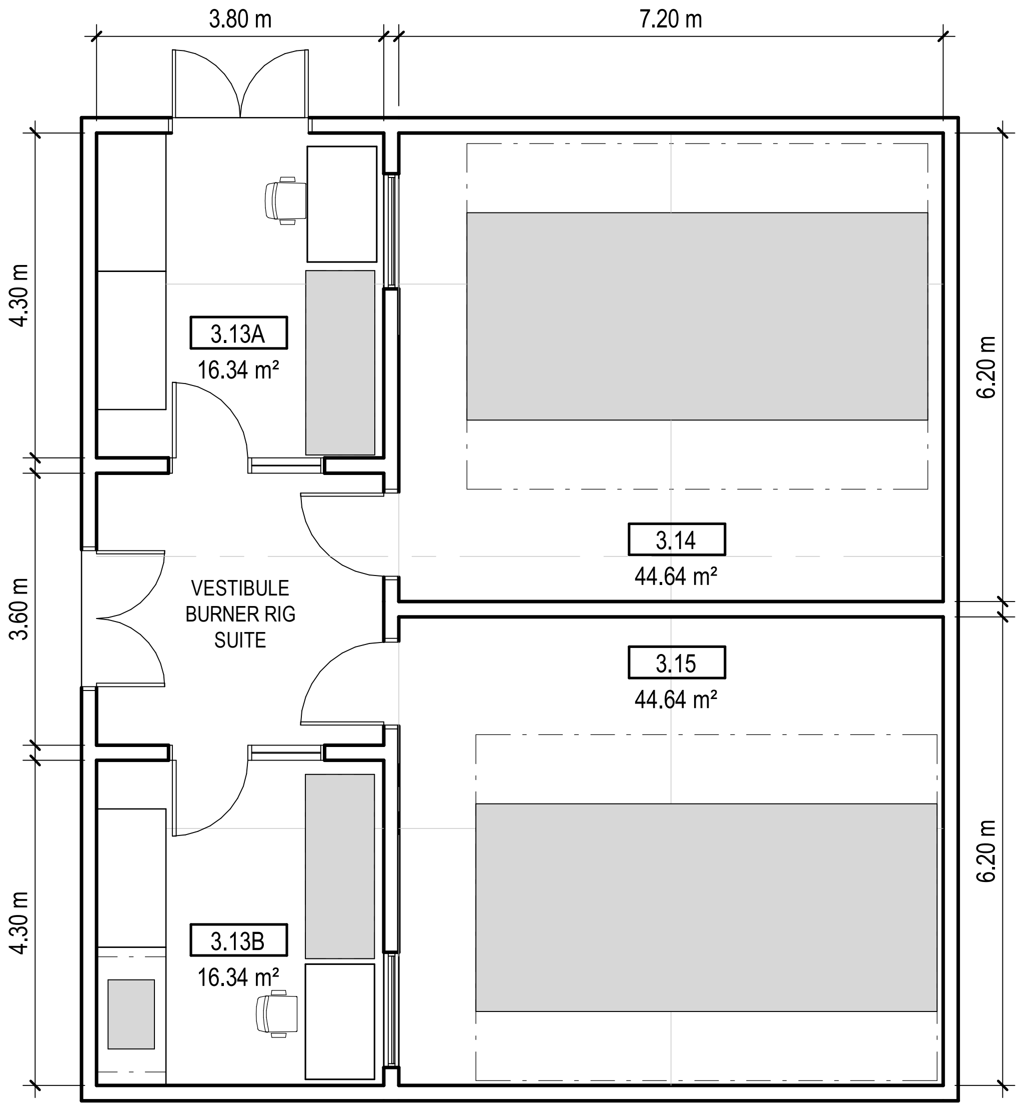
FOR INDIVIDUAL ROOMS REFER TO RDS-013, RDS-014, RDS-015 AND RDS-036.

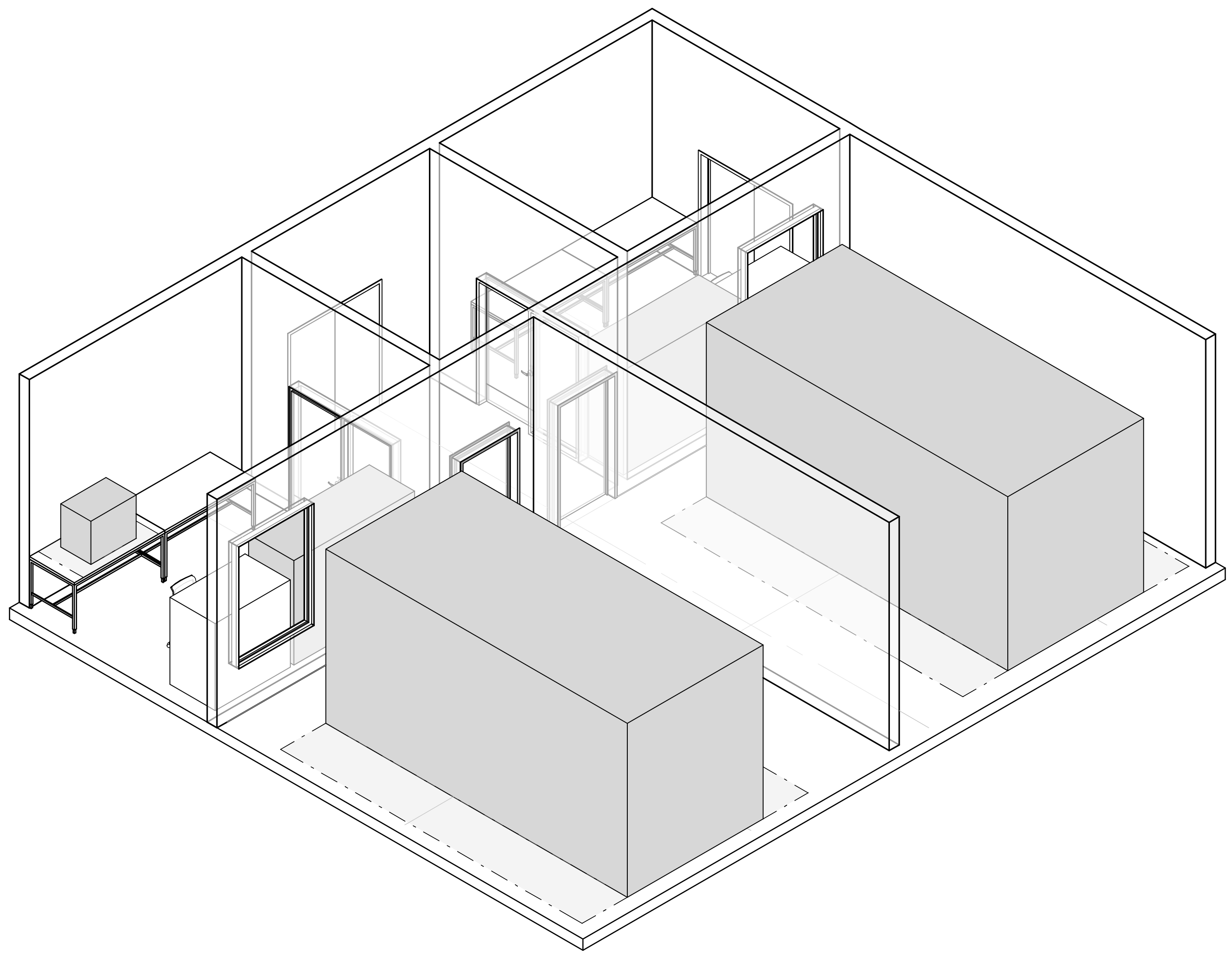




1
103-2
SPIN RIG SUITE
1 : 200

REVISION # & ISSUE DATE: REV 5, 20/05/2021		SPACE ID #:		RDS: 104-2
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY			SPACE NAME: BURNER RIG SUITE
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





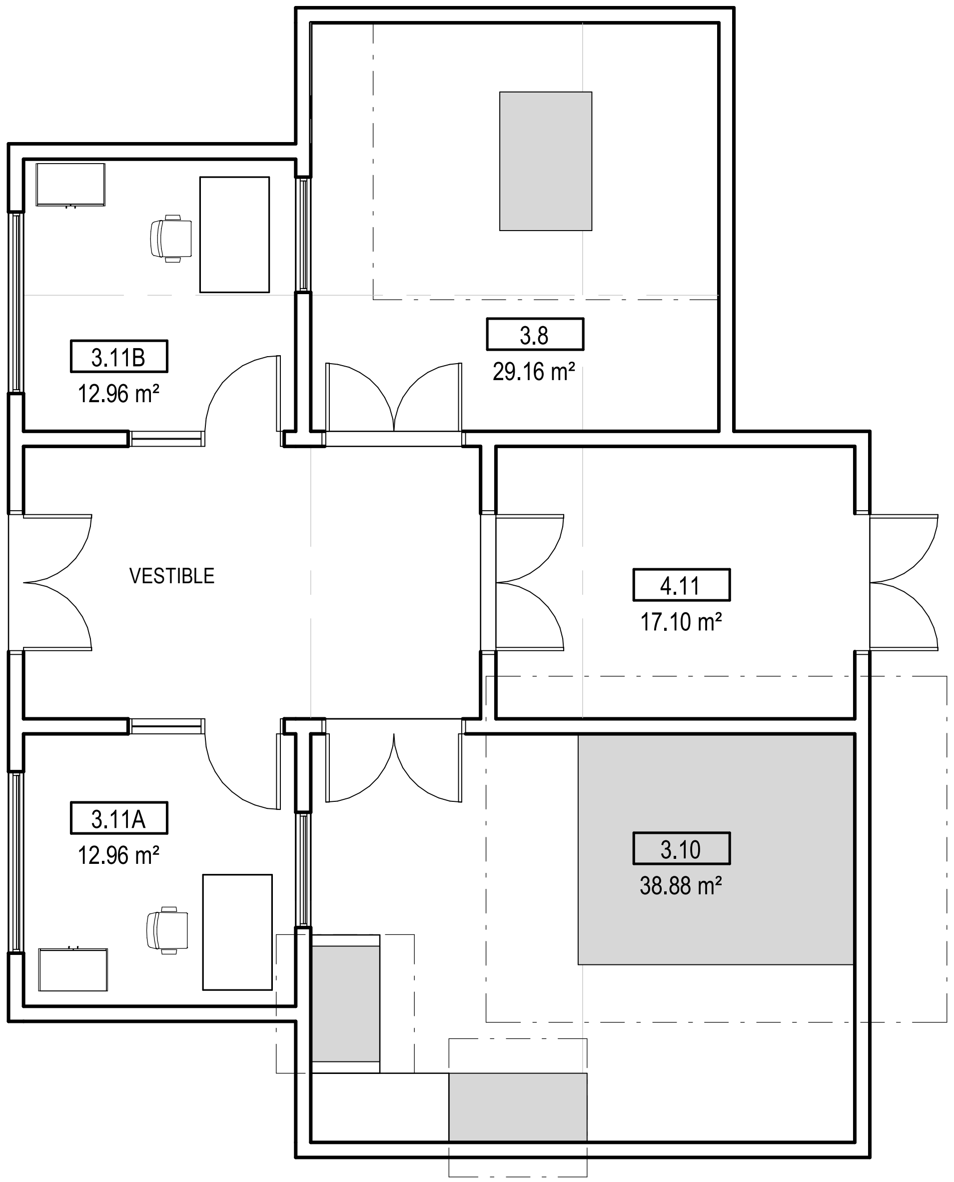
FOR INDIVIDUAL ROOMS REFER TO
RDS-021, RDS-022 AND RDS-023.

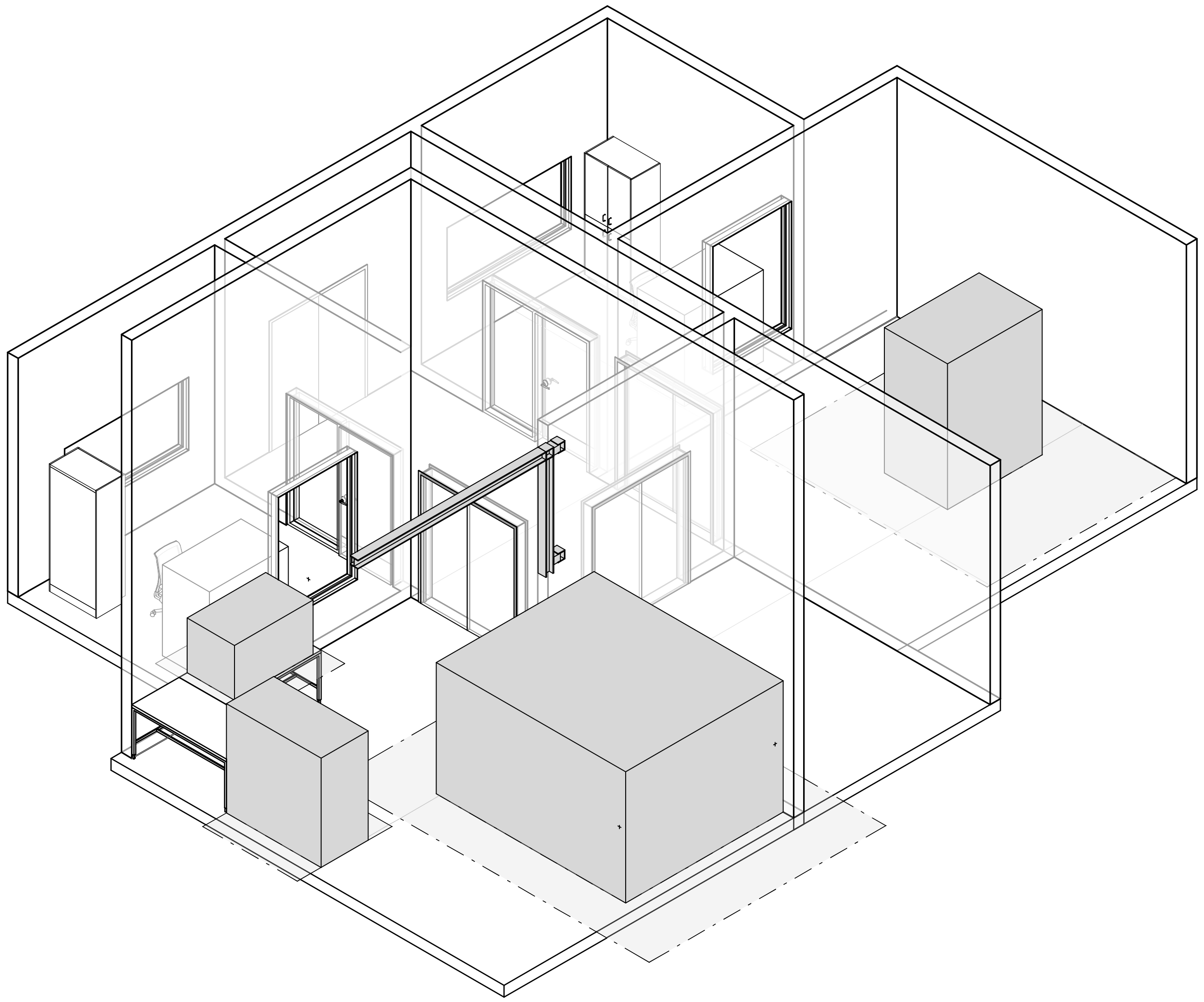
1
104-2

BURNER RIG SUITE

1 : 100

REVISION # & ISSUE DATE: REV 4, 20/05/2021		SPACE ID #:	**RDS: 105-2**
DEPARTMENTS / GROUP NAME: HEAT TREATMENT	SPACE TYPE: LABORATORY		**SPACE NAME: HIP AND TGST SUITE**
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		





FOR INDIVIDUAL ROOMS REFER TO
RDS-016, RDS-018, RDS-019 AND RDS-046.

1
105-2
HIP AND TGST SUITE
1 : 100

REVISION # & ISSUE DATE: REV 9, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: HIGH BAY LABORATORY	SPACE ID#: 1.1	RDS-001-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 1,600	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 24 HOURS	SPECIE USE: N/A	NRC HIGH BAY
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	The NRC High Bay will utlised for large component testing and research of aeronautic, mechanical, structural, and materials characteristics. Department/Group Name: ARC-SMPL/SI.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE: NOT REQUIRED
- OTHER / COMMENTS:
- CONCRETE HARDENER AND SLOPED TO DRAIN
- PREFERRED VENDOR(S): NA

FLOOR BASE
- TYPE:
- INTEGRAL COVE: NO
- OTHER / COMMENTS:
- PREFERRED VENDOR(S): NA

WALL TYPE / CONSTRUCTION
- WALL TYPE: (OTHER-DEFINE)
- SHIELDING: NO
- IMPRACT RESISTANT: YES
- WATER RESISTANT: YES
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE: N/A
- WALL FINISH: PAINT
- OTHER / COMMENTS:
- METAL LINER ABOVE CMU OR CONCRETE WALLS
- PREFERRED VENDOR(S): NA

PRIMARY CONTAINMENT DEVICE
- PC DEVICE: N/A
- PC DEVICE: N/A
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: TO STRUCTURE
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE: N/A
- OTHER / COMMENTS: 15 m CLEAR SPACE BELOW CRANE - CEILING HEIGHT
- TO ACCOUNT FOR CRANE HEIGHT ABOVE 15 m CLEARANCE
- PREFERRED VENDOR(S): NA

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION: NO
- SURFACE DECONTAMINATION: YES
- FIRE EXTINGUISHER CABINET: YES
- CRANE SUPPORT: YES
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:
- DURABLE AND CLEANABLE SURFACES

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: NO
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: STAINLESS STEEL
- OTHER / COMMENTS:
- WORKBENCH SURFACE WOOD OR STEEL, 8 DRAWER STORAGE UNIT
- SS SHELVES, TALL STORAGE CABINETS
- PREFERRED VENDOR(S): NA
- CHEMICAL STORAGE: YES
- ACID: YES
- BASE: NO
- FLAMMABLE LIQUIDS: YES
- STORAGE CABINET: YES
- STORAGE DRAWER UNIT: YES
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: YES
- OTHER / COMMENTS:
- PREFERRED VENDOR(S): NA

ADDITONAL USER COMMENTS
- RETRACTABLE VERTICAL FABRIC DOOR FOR SHARING
- 40 m WIDTH OF ADJOINING TSB HIGH BAY (COLUMNS
- PERMITTED AT BOUNDARY WITH MAXIMUM PERMISSIBLE
- SPACING - WITH DOOR ADJACENT)
- (high STC required with heights up to and greater than 12-15 m)

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: REQUIRED
- WINDOWS: YES
- OPERABLE: NO
- SAFETY GLAZING: YES
- SAFETY ETCHING: NO
- SHADE CONTROL: YES
- OTHER / COMMENTS:
- OTHER / COMMENTS: CONTROLLABLE BLINDS
- PREFERRED VENDOR(S): NA

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm X 2150 mm
- SECONDARY LEAF (IF APPLICABLE): 900 mm X 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE: PANIC BAR
- ARMOUR PLATE: N/A
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL: YES
- DOOR INTERLOCK: NOT APPLICABLE
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS: NO
- DOOR JAMB GUARDS: NO
- OTHER / COMMENTS:
- HMI FOR EXTERIOR, HM FIRE RATED AT SEPARATIONS
- PREFERRED VENDOR(S): NA
- DOOR TYPE: OVERHEAD DOOR
- PRIMARY LEAF: VARIES AND REFER TO COMMENTS BELOW
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL: (OTHER-DEFINE)
- LOCKSET TYPE: (OTHER-DEFINE)
- ARMOUR PLATE: N/A
- KICK PLATE: N/A
- ACCESS CONTROL: YES
- DOOR INTERLOCK: NOT APPLICABLE
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS: NO
- DOOR JAMB GUARDS: NO
- OTHER / COMMENTS: STEEL BOLLARDS, REMOTE OPERATOR
- PRIMARY LEAF: REGARDING 1.2 TSB HIGH BAY ACCESS -- MOVEABLE
- PARTITION WALL TO MAX. WIDTH (40m) ADJOINING TSB HIGH BAY
- MAX. PERMISSIBLE HEIGHT - COLUMNS ALLOWED AT BEST POSSIBLE
- SPACING - INTENT IS TO SHARE MAX. FLOOR WIDTH/VERTICAL HT
- DOOR SPEC SHOULD ALLOW FOR TRANLUCENCY/INSULATION/STC
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE:
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 23ºC
- SETPOINTS (WINTER): 21ºC
- +/- 2ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: CO/NO2 DETECTION EXHAUST
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:
- - ABILITY TO INTEGRATE PERMANENT EXHAUST POINTS WITHIN FACILITY
- ENVELOPE TO ALLOW NRC TO VENT EQUIPMENT AS REQUIRED. QUANTITY
- FOUR (4) LOCATIONS.

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: CO/NO2 DETECTION AND ALARM SYSTEM.
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: YES (NON POTABLE WATER)
- STEAM: NO
- COMP. AIR: YES (UTILITY) - IN TRENCH AND AROUND PERIMETER
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- HYDRAULIC SUPPLY: YES
- OTHER PROCESS FLUIDS:
- COMMENTS: PROCESS PIPING THROUGH FLOOR TRENCHES

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES:

PLUMBING

FIXTURES
- SINK TYPES: SS DOUBLE BASIN
- SINK DEPTH:
- SINK COUNTS: 1
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP: NO
- PEGBOARD: NO
- FAUCET TYPE: MIXING, SWING SPOUT, DECK MOUNTED
- PIPING MATERIAL:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: YES
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
- OTHER: HANDWASH SINK, HOSE BIB ADJACENT TO EMERG SHOWER.
- NON POTABLE WATER HOSE BIB CONN. IN TRENCH AT LOCATIONS
- AND FREQUENCY SIMILAR TO HYDRAULIC CONNECTION POINTS

DRAINS / VENTS
- FLOOR DRAIN: MULTIPLE
- TRAP DEPTH: 75mm OR 100mm
- MATERIAL
- HEPA FILTERED PLUMBING VENTS: NO
- EFFLUENT DECONTAMINATION SYSTEM: NO
- EFFLUENT pH CONTROL: NO
- OTHER / COMMENTS:
- DRAINAGE THROUGHOUT CONNECTED TO OIL/GRIT SEPARATOR
- NO FLOOR DRAINS IN EQUIPMENT/CIRCULATION/FLEX ZONES

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: DOUBLE INTERLOCK PRE-ACTION SYSTEM
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS: DRY PIPE / PRE-ACTION
- FREQUENT CUTTING AND WELDING. DO NOT WANT TO TRIGGER
- FALSE FIRE ALARM.

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- **HAZARD 1**
- CHEMICAL IN SMALL AMOUNTS
- **HAZARD 2**
- RADIATION, XRD
- **HAZARD 3**

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 1.5 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 12 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING: Fall arrest system hung from ceiling
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: 10 t overhead crane spanning 40 m, 15 m clear to
- u/s of double crane hooks, 6m x 12m moveable steel strong wall required
- (loading capacity TBD). Full strong floor coverage. Four strong floors
- separated by service trenches. 1m x 1m grid of anchorage points in strong
- floors. Vertical capacity of no less than 450 kN (100 kips), with 1000 Kn
- (224 kips) or higher desired per anchor point.

ELECTRICAL / POWER

- CLASS TYPE: EM + NORMAL + UPS
- VOLTAGE / CURRENT / PH 1: 600V / XXX / 3 PH 480V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2: 208V / XXX / 3PH
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: YES
- PLUG SPACING:
- FLOOR BOX W TRENCH: YES
- OTHER / COMMENTS: DEDICATED POWER PANELS
- EPO REQUIRED, WIREMOLD ABOVE WORKBENCHES, 3 IN
- FLOOR TRENCHES C/W POWER & DATA, REMOVABLE COVER

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT / INDIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: YES
- DAYLIGHT CONTROL: YES
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:
- MANUAL OVERRIDE, MINIMUM 4 ZONES

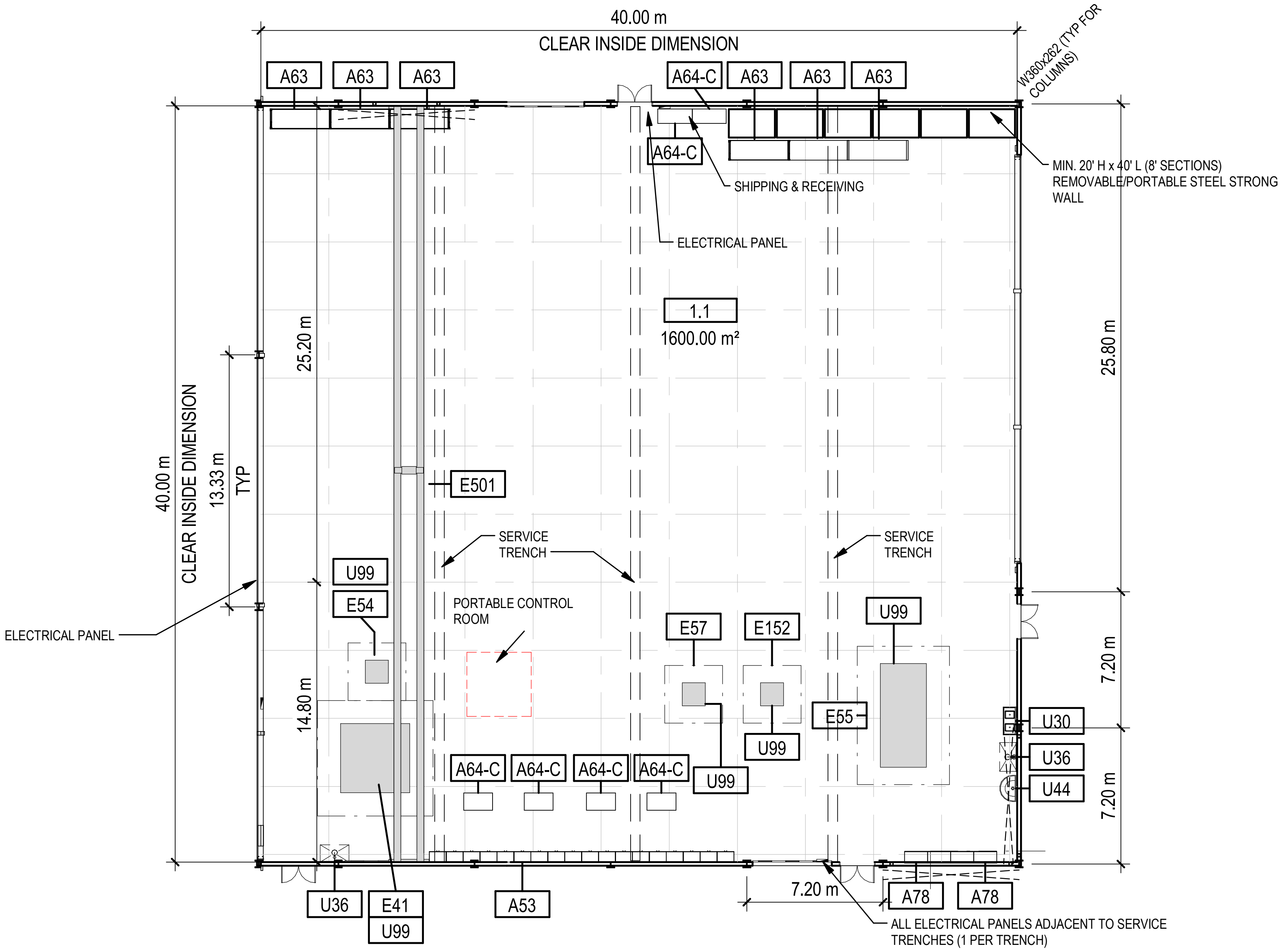
COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:
- DATA OUTLETS AROUND PERIMETER OF ROOM

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued
- by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 9, 20/05/2021		SPACE ID #: 1.1	RDS: 001-2
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: HIGH BAY LABORATORY		SPACE NAME: NRC HIGH BAY
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 24 HOURS	LAB CERTIFICATION REQUIREMENTS:	

REQUIRED ADJACENCIES:

ROOM — PRIMARY ADJACENCY: 1.2, 3.16, 3.18, 4.2, 4.6, 4.14 — SECONDARY ADJACENCY: 2.3, 2.5, 3.23 — TERTIARY ADJACENCY: NON DESTRUCTIVE EVALUATION



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001-2

1.1 - NRC HIGH BAY

1 : 300

LEGEND

ARCHITECTURAL SYSTEMS

A53	CASEWORK, TALL STORAGE CABINET
A63	STORAGE SHELVING, INDUSTRIAL
A64-C	WORKBENCH, STATIONARY
A78	STORAGE UNIT, 8 DRAWER

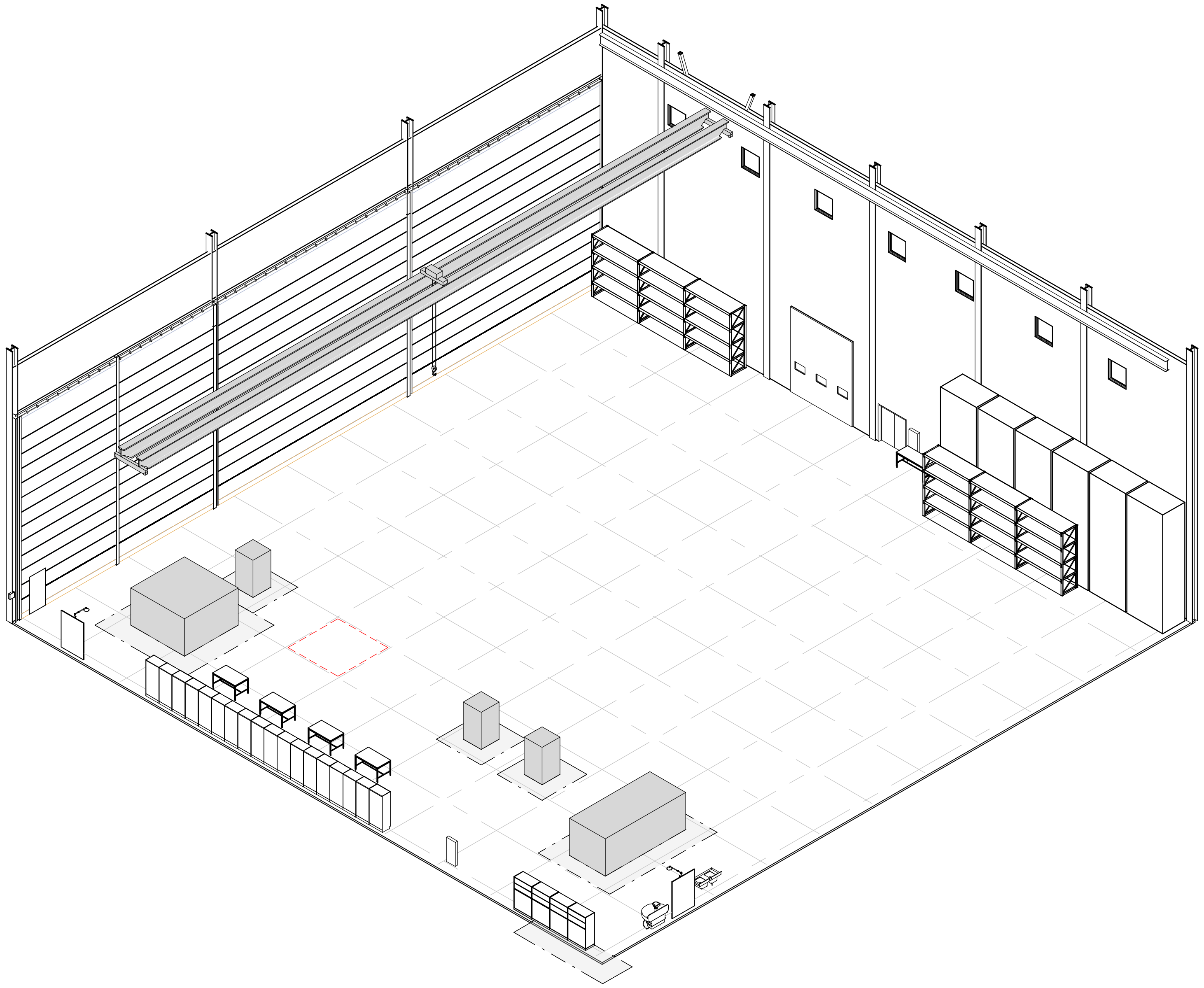
UTILITIES / SYSTEMS

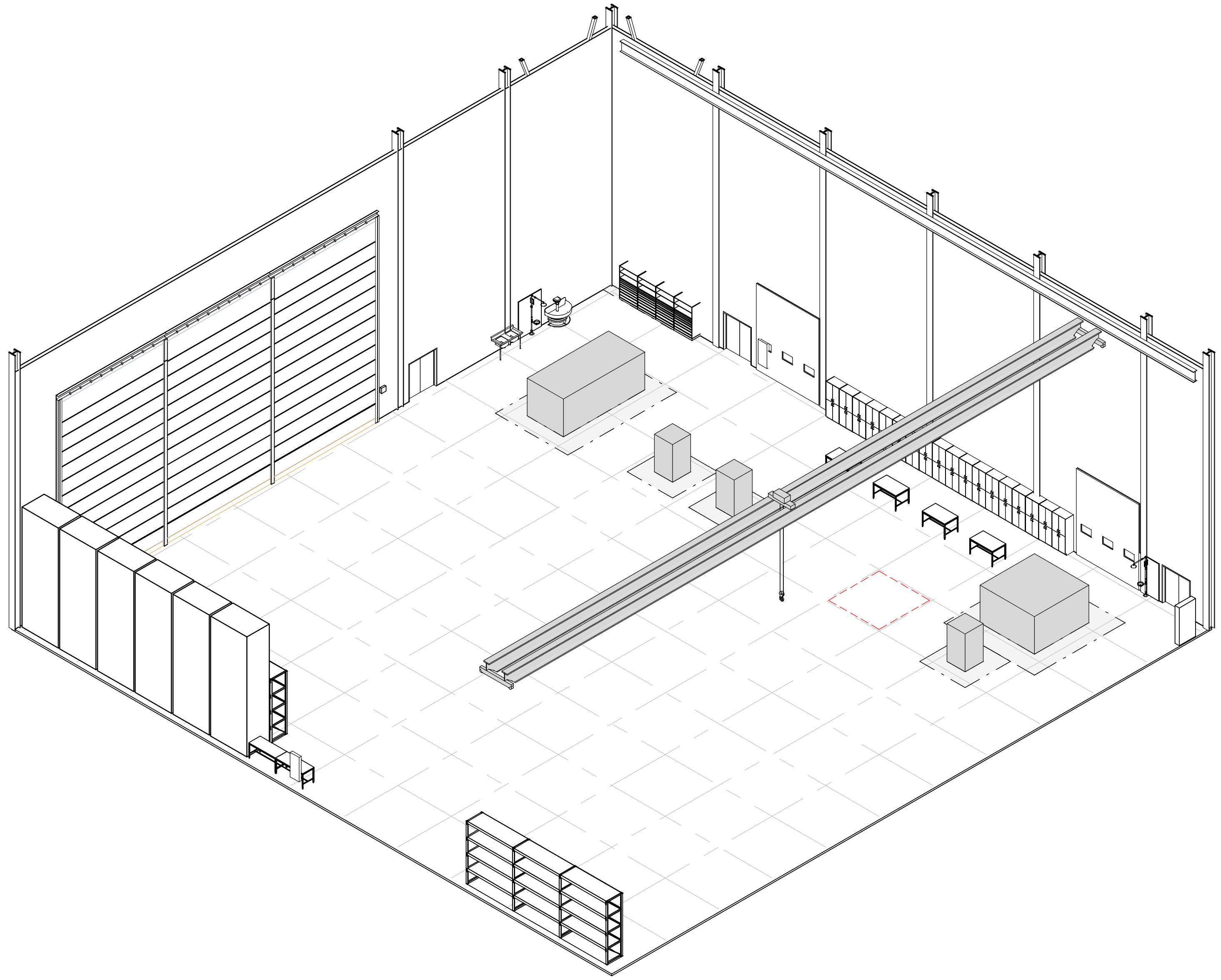
U30	HOT & COLD WATER, LAB
U36	SAFETY EMERGENCY SHOWER AND EYEWASH
U44	SINK, HANDWASH, MULTI-USER
U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E41	TESTING MACHINE BALDWIN
E54	24 CHANNEL FULL SCALE TEST CONTROL SYSTEM
E55	STRUCTURAL HEALTH MONITORING TEST PLATFORM
E57	MTS FLEX DAC FT200 CONTROL SYSTEM
E152	26 CHANNEL FULL SCALE TEST CONTROL SYSTEM
E501	10t OVERHEAD CRANE (2 HOOKS)

REVISION # & ISSUE DATE: REV 9, 20/05/2021		SPACE ID #: 1.1		**RDS: 001-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: HIGH BAY LABORATORY	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: NRC HIGH BAY**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 24 HOURS			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY 1.2, 3.16, 3.18, 4.2, 4.6, 4.14 — SECONDARY ADJACENCY 2.3, 2.5, 3.23 — TERTIARY ADJACENCY NON DESTRUCTIVE EVALUATION			





REVISION # & ISSUE DATE: REV 8, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB ENGINEERING LAB	SPACE TYPE: HIGH BAY LABORATORY	SPACE ID#: 1.2	**RDS-002-1**
CHIEF SCIENTIST: Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 1,250	**Space Name:**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 7AM-530PM	SPECIE USE: N/A	**TSB HIGH BAY**
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	The TSB High Bay will be a fundamental laboratory for the examination, analysis, or reconstruction of wreckage.		

ARCHITECTURAL

FLOOR FINISH
TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
SLIP RESISTANCE:
ANTI-STATIC RESISTANCE: NOT REQUIRED
OTHER / COMMENTS:
15M CLEAR TO UNDERSIDE OF STRUCTURE / ACOUSTIC DECK
PREFERRED VENDOR(S): NA

FLOOR BASE
TYPE:
INTEGRAL COVE: NO
OTHER / COMMENTS:
CONCRETE CURB BASE - DECONTAMINATION CURB CONTAINMENT
PREFERRED VENDOR(S): NA

WALL TYPE / CONSTRUCTION
WALL TYPE: (OTHER-DEFINE)
SHIELDING: NO
IMPRACT RESISTANT: YES
WATER RESISTANT: YES
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE: N/A
WALL FINISH: PAINT
OTHER / COMMENTS:
METAL LINER ABOVE CMU OR CONCRETE WALLS
MOVEABLE PARTITION AT DECONTAMINATION AREA
PREFERRED VENDOR(S): NA

PRIMARY CONTAINMENT DEVICE
PC DEVICE: N/A
PC DEVICE: N/A
OTHER / COMMENTS:
PREFERRED VENDOR(S): NA

ACCESSIBLITY REQUIREMENTS
ACCESSIBILITY ELEMENT 1:
ACCESSIBILITY ELEMENT 2:
ACCESSIBILITY ELEMENT 3:
ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
SPACE REQUIRED FOR RECYCLING BIN (m²):
SPACE REQUIRED FOR COMPOSTING BIN (m2):
UNOCCUPIED PERIOD TEMP. SET BACK:
TEMPERATURE SET BACK MAXIMUM (ºC):
TEMPERATURE SET BACK MINIMUM (ºC):
INDIVIDUAL TEMPERATURE CONTROL:
OTHER / COMMENTS:

CEILING
CEILING TYPE: OPEN CEILING
HEIGHT: TO STRUCTURE
FINISH: OPEN CEILING (PAINTED)
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE: N/A
OTHER / COMMENTS:
15m CLEAR TO UNDERSIDE OF STRUCTURE / ACOUSTIC DECK
PREFERRED VENDOR(S): NA

SPECIAL DESIGN CONSIDERATIONS
GASEOUS DECONTAMINATION: NO
SURFACE DECONTAMINATION: YES
FIRE EXTINGUISHER CABINET: YES
CRANE SUPPORT: YES
ELECTROMAGNETIC SHIELDING:
PENETRATION SEALING:
OTHER / COMMENTS:
DURABLE AND CLEANABLE SURFACES

CASEWORK / MILLWORK
CASEWORK SYSTEM: MODULAR LEG FRAMED
CASEWORK MATERIAL: PAINTED METAL
DEPTH: (OTHER-DEFINE)
UPPER CABINETS: N/A
HEIGHT ADJUSTABLE: NO
BASE CABINETS: N/A
COUNTERTOP MATERIAL: N/A
OTHER / COMMENTS: STORAGE SHELVING
PREFERRED VENDOR(S): NA
CHEMICAL STORAGE: YES
ACID: YES
BASE: NO
FLAMMABLE LIQUIDS: YES
STORAGE CABINET: NO
STORAGE DRAWER UNIT: NO
SHIELDED STORAGE UNIT: NO
OVERHEAD SERVICE CARRIER: YES
OTHER / COMMENTS:
PREFERRED VENDOR(S): NA

ADDITONAL USER COMMENTS
RETRACTABLE VERTICAL FABRIC DOOR FOR SHARING
40 m WIDTH OF ADJOINING TSB HIGH BAY (COLUMNS
PERMITTED AT BOUNDARY WITH MAXIMUM PERMISSIBLE
SPACING - WITH DOOR ADJACENT)
(high STC required with heights up to and greater than 12-15 m)

WINDOWS / DAYLIGHTING
NATURAL LIGHT: REQUIRED
WINDOWS: YES
OPERABLE: NO
SAFETY GLAZING: YES
SAFETY ETCHING: NO
SHADE CONTROL: YES
OTHER / COMMENTS: CONTROLLABLE BLINDS
PREFERRED VENDOR(S): NA

DOORS/ HARDWARES
DOOR TYPE: DOUBLE
PRIMARY LEAF: 900 mm X 2150 mm
SECONDARY LEAF (IF APPLICABLE): 900 mm X 2150 mm
VISION PANEL: BOTH LEAVES
LOCKSET TYPE: PANIC BAR
ARMOUR PLATE: N/A
KICK PLATE: BOTH SIDES
ACCESS CONTROL: YES
DOOR INTERLOCK: NOT APPLICABLE
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS: NO
DOOR JAMB GUARDS: NO
OTHER / COMMENTS:
HMI FOR EXTERIOR, HM FIRE RATED AT SEPARATIONS
PREFERRED VENDOR(S): NA

DOOR TYPE: DOUBLE
PRIMARY LEAF: VARIES
SECONDARY LEAF (IF APPLICABLE):
VISION PANEL: (OTHER-DEFINE)
LOCKSET TYPE: N/A
ARMOUR PLATE: N/A
KICK PLATE
ACCESS CONTROL: YES
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS: NO
DOOR JAMB GUARDS: NO
OTHER / COMMENTS:
OTHER / COMMENTS: STEEL BOLLARDS, REMOTE OPERATOR
PREFERRED VENDOR(S): NA

DOOR TYPE: OVERHEAD DOOR
PRIMARY LEAF: SIZE VARIES
SECONDARY LEAF (IF APPLICABLE):
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
SETPOINTS (SUMMER): 25ºC
SETPOINTS (WINTER): 20ºC
+/- (ºC)

CONTROLS
CONTROLS TYPE: ALL DIGITAL
CONTROLS FRAMEWORK: BACNet OVER IP
OTHER / COMMENTS:
- UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK C/W LOCAL
OCCUPANCY OVERRIDE

HUMIDITY
STATS: ZONE
SETPOINTS (SUMMER): 50% RH
SETPOINTS (WINTER): 30% RH
+/- 5% RH
TRIM HUMIDIFICATION: NO

VENTILATION
AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
ROOM FILTRATION - EXHAUST: NONE
ROOM FILTRATION - SUPPLY: NONE
AIR CIRCULATION METHOD: 100% SUPPLY
SPECIALITY EXHAUST: N/A
DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
DIRECTIONAL AIRFLOW METHOD: FORCED
PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
ROOM ISOLATION DAMPERS: NONE
FILTRATION TYPE: N/A
PRESSURE AIRFLOW INDICATOR: NONE
EQ. EXHAUST: N/A
MECHANICAL NOISE (DECIBELS / NC): NC50
OTHER / COMMENTS:
- VEHICLE EXHAUST EXTRACTION SYSTEM FOR FUTURE.
- CUTTING/WELDING EMISSIONS CAPTURED BY MOBILE EXTRACTION UNIT.

MONITORING AND ALARMS
PRESSURE / AIRFLOW INDICATOR: NO
EQUIPMENT MONITORING POINTS: NO
HVAC ALARM RELATIVE PRESSURIZATION: NO
ANIMAL ROOM MONITORING SYSTEM: NO
GAS DETECTION: CO/NO2 GAS DETECTION SYSTEM
LIQUID / LEAK DETECTION: NO
TEMP / HUMIDITY: YES

PROCESS PIPING
PROCESS WATER: YES - WALL MOUNTED SERVICE BOX
STEAM: NO
COMP. AIR: YES (UTILITY) - WALL MOUNTED SERVICE BOX
BREATHING AIR: NO
ANIMAL WATER: NO
PURIFIED WATER: NO
OTHER PROCESS FLUIDS:
OTHER PROCESS FLUIDS:
OTHER: DEDICATED COMPRESSED AIR, WATER, HOSE BIBB, AND DRAIN
REQ'D ADJACENT TO BAND SAW (E75).

GASES
SUPPLY SYSTEM TYPE:
GAS TYPES:

PLUMBING

FIXTURES
SINK TYPES: SS DOUBLE BASIN
SINK DEPTH:
SINK COUNTS: 1
SINK DIMENSIONS:
INTEGRAL TO CASEWORK / BENCHTOP: NO
PEGBOARD: NO
FAUCET TYPE: MIXING, SWING SPOUT, DECK MOUNTED
PIPING MATERIAL:
SIZE DIAMETER:
VENT SIZE DIAMETER:
SAFETY EMERGENCY SHOWER ANSI 358.1: YES
CORROSIVE MATERIAL: NO
SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
OTHER: HANDWASH SINK
HOSE BIB AND POTENTIAL WATER DISTRIBUTION THRU TRENCH.
HOSE BIB TO BE LOCATED ALONG WALL.
HOSE BIBB AT DECONTAMINATION AREA

DRAINS / VENTS
FLOOR DRAIN: MULTIPLE
TRAP DEPTH: 75mm OR 100mm
MATERIAL
HEPA FILTERED PLUMBING VENTS: NO
EFFLUENT DECONTAMINATION SYSTEM: YES
EFFLUENT pH CONTROL: NO
OTHER / COMMENTS:
DRAINAGE THROUGHOUT CONNECTED TO OIL/GRIT SEPARATOR
NO FLOOR DRAINS IN EQUIPMENT/CIRCULATION/FLEX ZONES
WITH AUTO REDIRECT TO BIOLOGICAL WASTE / HAZARDOUS
WASTE CONTAINMENT TANK (REQUIRES MANUAL PUMP-OUT)

FIRE PROTECTION / ALARM
HAZARD CLASS:
SPRINKLER SYSTEM: YES
SPRINKLER SYSTEM TYPE: WET PIPE
FIRE DETECTION: NORMAL (TO CODE)
ALARM METHOD: NORMAL
OTHER / COMMENTS:
FREQUENT CUTTING AND WELDING. DO NOT WANT TO TRIGGER
FIRE ALARM. NO SMOKE DETECTORS

HAZARDS
BUILDING HAZARD CLASS (NBC / NSF):
HAZARD 1
CHEMICAL
HAZARD 2
RADIATION - VERY LOW AIRCRAFT INSTRUMENTATION
HAZARD 3
BIOLOGICAL - BLOOD, POSSIBLE TRACES OF HUMAN REMAINS

STRUCTURAL
STRUCTURAL DESIGN IMPLICATIONS:
ROLLING LOAD LIMITS:
VIBRATION CRITERA:
FLOOR LOADING IMPLICATIONS (DEAD): 1.5 kPa
FLOOR LOADING IMPLICATIONS (LIVE): 12 kPa
STRUCTURAL SHIELD REQUIREMENT:
CEILING LOADING:
SPECIAL PENETRATIONS:
OTHER / COMMENTS: 2 x 20 t overhead cranes spanning 25 m
10.9 m clear to underside of crane hooks
Additional point load allowance of 60 kN in 200 x 200 mm grid

ELECTRICAL / POWER

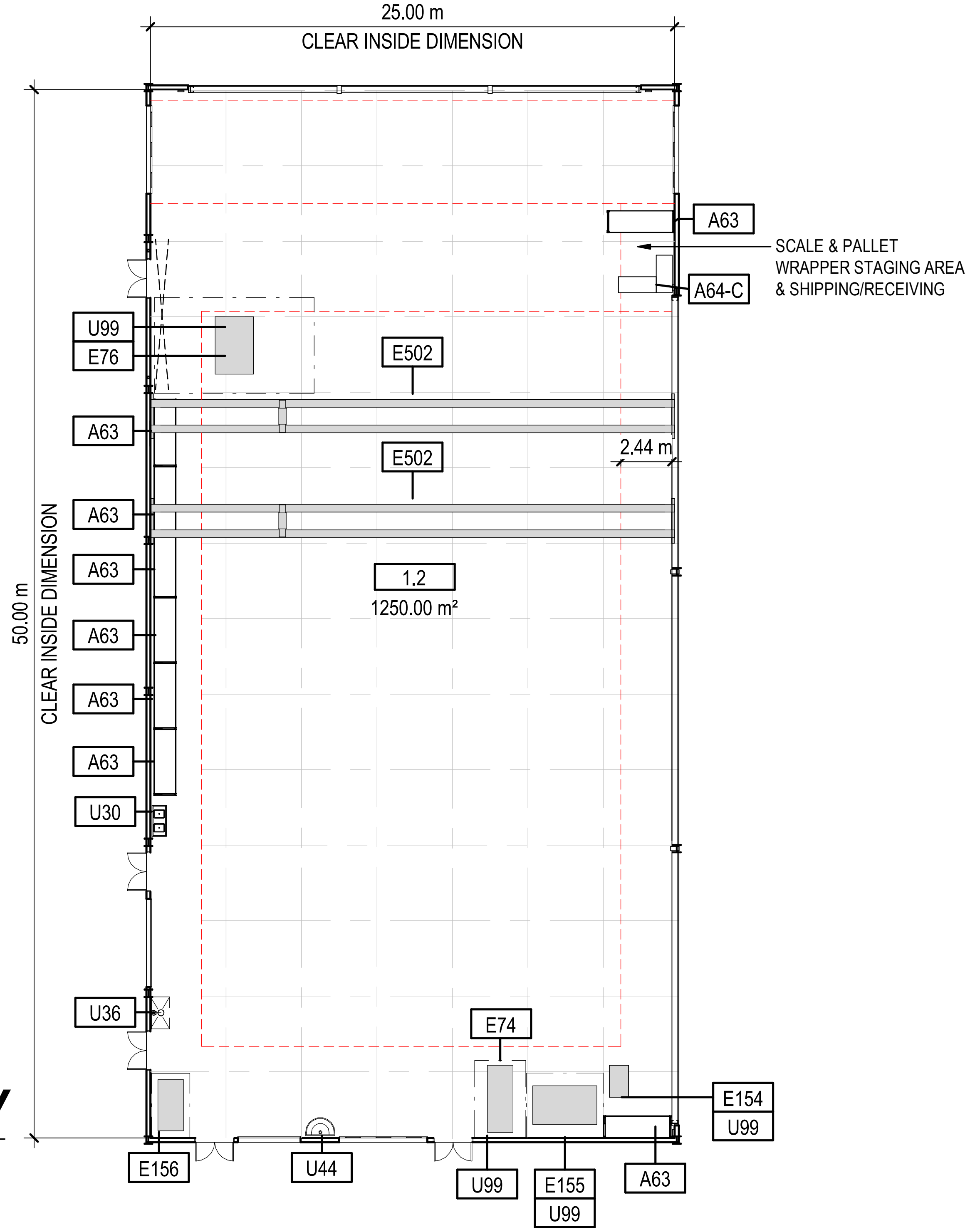
CLASS TYPE: EM + NORMAL + UPS
VOLTAGE / CURRENT / PH 1: 600V / XXX / 3 PH 480V / XXX / 3 PH
VOLTAGE / CURRENT / PH 2: 208V / XXX / 3PH
SPECIAL NEMA PLUG ARRANGEMENT:
POWER DENSITY:
OVERHEAD SERVICE CARRIER: N/A
ISOLATED GROUNDING: YES
GROUND FAULT PROTECTION: N/A
WEATHER PROOF COVER: YES
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
TYPE IP RATING HERE:
RACEWAY: YES
PLUG SPACING:
FLOOR BOX W TRENCH: YES
OTHER / COMMENTS: DEDICATED POWER PANELS
EPO REQUIRED, WIREMOLD ABOVE WORKBENCHES, 3 IN
FLOOR TRENCHES C/W POWER & DATA, REMOVABLE COVER

LIGHTING
SPECIALIZED LIGHTING: NO
SPECIALIZED CONTROL: NO
MOUNT: PENDANT CEILING
FIXTURE OUTPUT: DIRECT / INDIRECT
LIGHT LEVEL (LUX):
LIGHT COLOUR TEMP (KELVIN): 4000
DIMMING SYSTEM: YES
WHITE TUNING:
TASK LIGHTING: NO
SCENE/ZONE CONTROL: YES
OCCUPANCY SENSORS: YES
NIGHT LIGHT: YES
DAYLIGHT CONTROL: YES
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
SAFETY LIGHTS: NO
A/V EQUIPMENT INTERFACE:
OTHER / COMMENTS:
MANUAL OVERRIDE, MINIMUM 4 ZONES

COMMUNICATIONS
PHONE: YES
CELLULAR COMMUNICATION:
PUBLIC PAGING: YES
INTERCOM:
DATA TYPE / POINTS: COPPER RJ45
DATA PLUG SPACING:
WIRELESS: YES
CABLE TRAY TYPE:
OTHER / COMMENTS:
DATA OUTLETS AS SPECIFIC LOCATIONS

SECURITY
CONNECTION TO CENTRAL MONITORING STATION:
CCTV:
EMERGENCY DISTRESS CALL:
FAIL-SAFE HARDWARE:
INTRUDER SYSTEM:
ACCESS CONTROL (OPTIONS BELOW)
-
-
-
-
SECURITY EQUIPMENT:
SECURITY ZONES:
OTHER / COMMENTS:
VIDEO SURVEILLANCE
Refer to Appendix N - Protected B "RDS Security Input" document issued
by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 8, 20/05/2021		SPACE ID #: 1.2	RDS: 002-2
DEPARTMENTS / GROUP NAME: TSB ENGINEERING LAB	SPACE TYPE: HIGH BAY LABORATORY		SPACE NAME: TSB HIGH BAY
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-530PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY 1.1, 2.1,3.1 — SECONDARY ADJACENCY 2.5, 2.6, 4.4 — TERTIARY ADJACENCY		



1 002-2 **1.2 - TSB HIGH BAY**
1 : 300

LEGEND

ARCHITECTURAL SYSTEMS

A63	STORAGE SHELVING, INDUSTRIAL
A64-C	WORKBENCH, STATIONARY

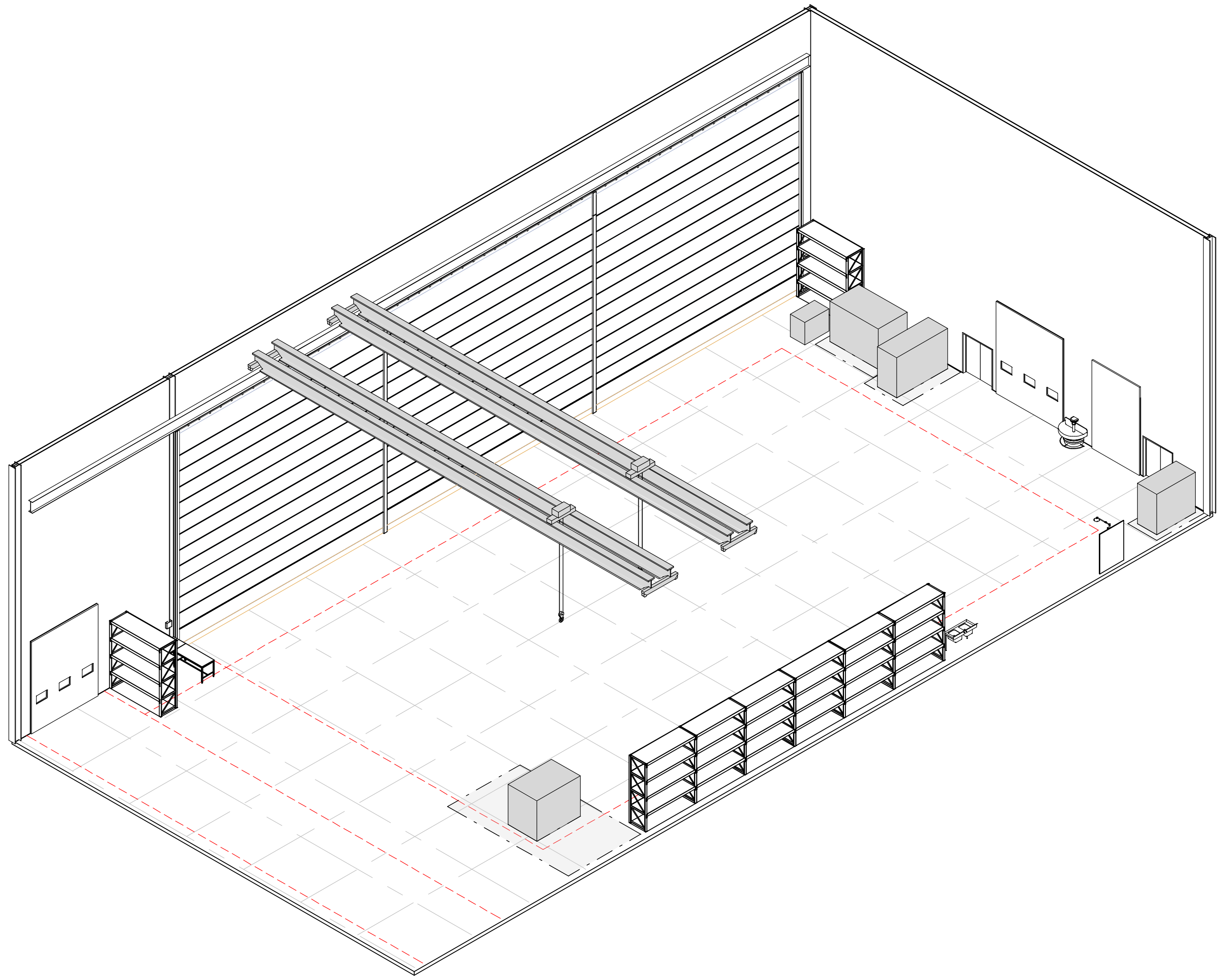
UTILITIES / SYSTEMS

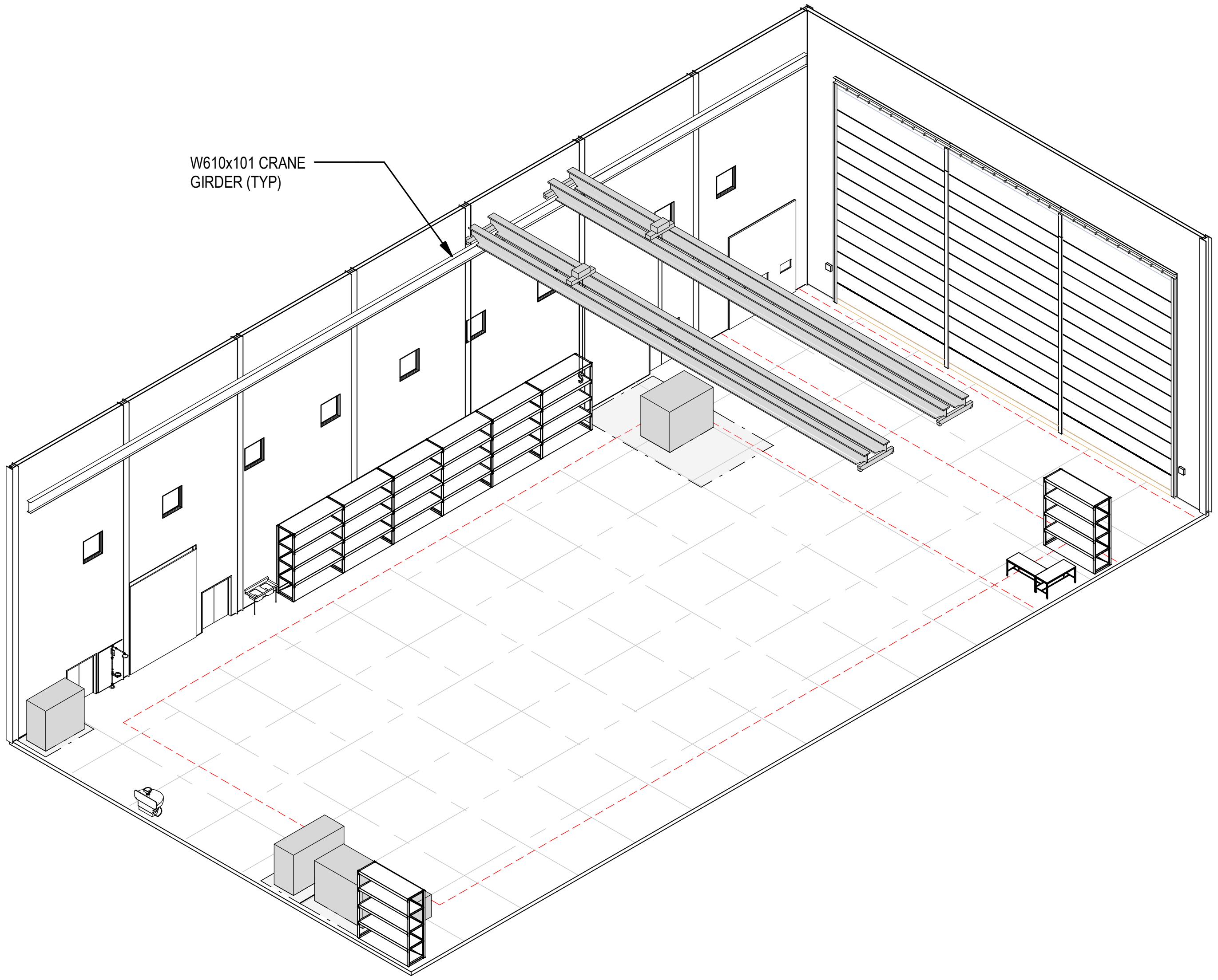
U30	HOT & COLD WATER, LAB
U36	SAFETY EMERGENCY SHOWER AND EYEWASH
U44	SINK, HANDWASH, MULTI-USER
U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E74	ELECTRIC FORKLIFT
E76	VERTICAL BAND SAW - MARVEL SERIES 8 MARK III
E154	FLOOR SCRUBBER
E155	MAGNETIC PARTICLE INSPECTION UNIT
E156	PNEUMATIC TOOLS
E502	20t OVERHEAD CRANE

REVISION # & ISSUE DATE: REV 8, 20/05/2021		SPACE ID #: 1.2	**RDS: 002-3**
DEPARTMENTS / GROUP NAME: TSB ENGINEERING LAB	SPACE TYPE: HIGH BAY LABORATORY	LAB CERTIFICATION REQUIREMENTS:	**SPACE NAME: TSB HIGH BAY**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-530PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY 1.1, 2.1,3.1 — SECONDARY ADJACENCY 2.5, 2.6, 4.4 — TERTIARY ADJACENCY		





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB ENGINEERING LAB	SPACE TYPE: WORKSHOP	SPACE ID#: 2.1	**RDS-003-1**
CHIEF SCIENTIST: Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 103.68	**Space Name:**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 7AM-530PM	SPECIE USE: N/A	**TEAR DOWN WORKSHOP**
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Support workshop space for disassembly workflow and analysis of wreckage. Includes an overhead crane and supports activities of the TSB High Bay Lab. Requires large surface work areas for large pieces of wreckage.		

ARCHITECTURAL

FLOOR FINISH
TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
SLIP RESISTANCE:
ANTI-STATIC RESISTANCE: NOT REQUIRED
OTHER / COMMENTS:
CONCRETE HARDENER AND SLOPED TO DRAIN
EPOXY FINISH TO BE CONFIRMED
PREFERRED VENDOR(S): NA

FLOOR BASE
TYPE:
INTEGRAL COVE: NO
OTHER / COMMENTS:
CONCRETE CURB BASE
PREFERRED VENDOR(S): NA

WALL TYPE / CONSTRUCTION
WALL TYPE: MASONRY
SHIELDING: NO
IMPRACT RESISTANT: YES
WATER RESISTANT: YES
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE: N/A
WALL FINISH: EPOXY
OTHER / COMMENTS:
CMU WALLS FULL HEIGHT
PREFERRED VENDOR(S): NA

PRIMARY CONTAINMENT DEVICE
PC DEVICE: N/A
PC DEVICE: N/A
OTHER / COMMENTS:
PREFERRED VENDOR(S):

ACCESSIBLITY REQUIREMENTS
ACCESSIBILITY ELEMENT 1:
ACCESSIBILITY ELEMENT 2:
ACCESSIBILITY ELEMENT 3:
ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
SPACE REQUIRED FOR RECYCLING BIN (m^2):
SPACE REQUIRED FOR COMPOSTING BIN (m2):
UNOCCUPIED PERIOD TEMP. SET BACK:
TEMPERATURE SET BACK MAXIMUM (ºC):
TEMPERATURE SET BACK MINIMUM (ºC):
INDIVIDUAL TEMPERATURE CONTROL:
OTHER / COMMENTS:

CEILING
CEILING TYPE: OPEN CEILING
HEIGHT: TO STRUCTURE
FINISH: OPEN CEILING (PAINTED)
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE: N/A
OTHER / COMMENTS:
7m CLEAR TO UNDERSIDE OF STRUCTURE
PREFERRED VENDOR(S):

SPECIAL DESIGN CONSIDERATIONS
GASEOUS DECONTAMINATION: YES
SURFACE DECONTAMINATION: YES
FIRE EXTINGUISHER CABINET: YES
CRANE SUPPORT: YES
ELECTROMAGNETIC SHIELDING:
PENETRATION SEALING:
OTHER / COMMENTS:

CASEWORK / MILLWORK
CASEWORK SYSTEM: MODULAR LEG FRAMED
CASEWORK MATERIAL: PAINTED METAL
DEPTH: (OTHER-DEFINE)
UPPER CABINETS: N/A
HEIGHT ADJUSTABLE:
BASE CABINETS: N/A
COUNTERTOP MATERIAL: STAINLESS STEEL
OTHER / COMMENTS:
FLAMMABLE STORAGE CABINET, COUNTER,
VENTED CYLINDER CABINET, MOBILE STORAGE CABINET, DRAWERS
SS SHELVES, MOBILE HYDRAULIC SCISSOR LIFT TABLE
CHEMICAL STORAGE: YES
ACID: NO
BASE: NO
FLAMMABLE LIQUIDS: YES
STORAGE CABINET: YES
STORAGE DRAWER UNIT: YES
SHIELDED STORAGE UNIT: NO
OVERHEAD SERVICE CARRIER: YES
OTHER / COMMENTS:
PREFERRED VENDOR(S): NA

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
NATURAL LIGHT: NOT REQUIRED
WINDOWS: YES
OPERABLE: NO
SAFETY GLAZING: YES
SAFETY ETCHING: NO
SHADE CONTROL: NO
OTHER / COMMENTS:
OTHER / COMMENTS: WINDOW INTO HIGH BAY AREA
PREFERRED VENDOR(S): NA

DOORS/ HARDWARES
DOOR TYPE: SINGLE
PRIMARY LEAF: 1100 mm X 2150 mm
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL: PRIMARY LEAF
LOCKSET TYPE: (OTHER-DEFINE)
ARMOUR PLATE: N/A
KICK PLATE: BOTH SIDES
ACCESS CONTROL: YES
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS: NO
DOOR JAMB GUARDS: NO
OTHER / COMMENTS:
HMI FOR EXTERIOR, HM FIRE RATED AT SEPARATIONS
PREFERRED VENDOR(S):

DOOR TYPE: OVERHEAD DOOR
PRIMARY LEAF: 4200 mm X 5000 mm
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL: PRIMARY LEAF
LOCKSET TYPE: N/A
ARMOUR PLATE: N/A
KICK PLATE: N/A
ACCESS CONTROL: YES
DOOR INTERLOCK: NOT APPLICABLE
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS: NO
DOOR JAMB GUARDS: NO
OTHER / COMMENTS:
OTHER / COMMENTS: STEEL BOLLARDS
PREFERRED VENDOR(S): NA

DOOR TYPE:
PRIMARY LEAF:
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
SETPOINTS (SUMMER): 25ºC
SETPOINTS (WINTER): 21ºC
+/- 1ºC

CONTROLS
CONTROLS TYPE: ALL DIGITAL
CONTROLS FRAMEWORK: BACNet OVER IP
OTHER / COMMENTS:
- UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
STATS: ZONE
SETPOINTS (SUMMER): 50% RH
SETPOINTS (WINTER): 30% RH
+/- 5% RH
TRIM HUMIDIFICATION: NO

VENTILATION
AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
ROOM FILTRATION - EXHAUST: NONE
ROOM FILTRATION - SUPPLY: NONE
AIR CIRCULATION METHOD: 100% SUPPLY
SPECIALITY EXHAUST: N/A
DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
DIRECTIONAL AIRFLOW METHOD: FORCED
PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
ROOM ISOLATION DAMPERS: NONE
FILTRATION TYPE: N/A
PRESSURE AIRFLOW INDICATOR: NONE
EQ. EXHAUST: N/A
MECHANICAL NOISE (DECIBELS / NC): NC50
OTHER / COMMENTS:

MONITORING AND ALARMS
PRESSURE / AIRFLOW INDICATOR: NO
EQUIPMENT MONITORING POINTS: NO
HVAC ALARM RELATIVE PRESSURIZATION: NO
ANIMAL ROOM MONITORING SYSTEM: NO
GAS DETECTION: NO
LIQUID / LEAK DETECTION: NO
TEMP / HUMIDITY: YES

PROCESS PIPING
PROCESS WATER: NO
STEAM: NO
COMP. AIR: YES (UTILITY)
BREATHING AIR: NO
ANIMAL WATER: NO
PURIFIED WATER: NO
OTHER PROCESS FLUIDS:
OTHER PROCESS FLUIDS:

GASES
SUPPLY SYSTEM TYPE:
GAS TYPES:

PLUMBING

FIXTURES
SINK TYPES: SS DOUBLE BASIN
SINK DEPTH:
SINK COUNTS: 1
SINK DIMENSIONS:
INTEGRAL TO CASEWORK / BENCHTOP: NO
PEGBOARD: NO
FAUCET TYPE: MIXING, SWING SPOUT, DECK MOUNTED
PIPING MATERIAL:
SIZE DIAMETER:
VENT SIZE DIAMETER:
SAFETY EMERGENCY SHOWER ANSI 358.1: YES
CORROSIVE MATERIAL: NO
SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
OTHER: HANDWASH SINK

DRAINS / VENTS
FLOOR DRAIN: MULTIPLE
TRAP DEPTH: 75mm OR 100mm
MATERIAL
HEPA FILTERED PLUMBING VENTS: NO
EFFLUENT DECONTAMINATION SYSTEM: NO
EFFLUENT pH CONTROL: NO
OTHER / COMMENTS:
- DRAINAGE THROUGHOUT CONNECTED TO OIL/GRIT SEPARATOR

FIRE PROTECTION / ALARM
HAZARD CLASS:
SPRINKLER SYSTEM: YES
SPRINKLER SYSTEM TYPE: WET PIPE
FIRE DETECTION: NORMAL (TO CODE)
ALARM METHOD: NORMAL
OTHER / COMMENTS:

HAZARDS
BUILDING HAZARD CLASS (NBC / NSF):
HAZARD 1
CHEMICAL
HAZARD 2
BIOLOGICAL - BLOOD, POSSIBLE TRACES OF HUMAN REMAINS
HAZARD 3

STRUCTURAL
STRUCTURAL DESIGN IMPLICATIONS:
ROLLING LOAD LIMITS:
VIBRATION CRITERA:
FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICAITIONS (LIVE): 7.2 kPa
STRUCTURAL SHIELD REQUIREMENT:
CEILING LOADING:
SPECIAL PENETRATIONS:
OTHER / COMMENTS: 1.5 t (3000 lbs) two-axis overhead chain hoist

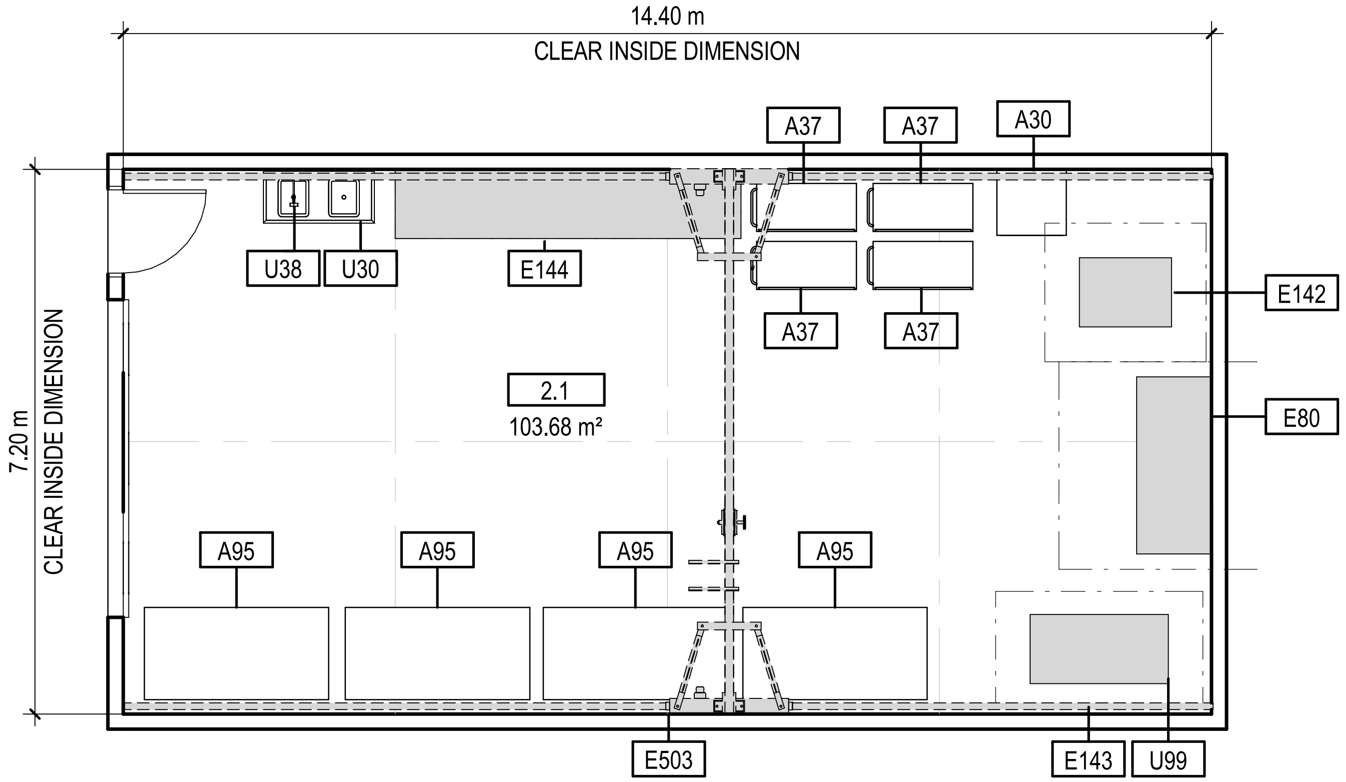
ELECTRICAL / POWER
CLASS TYPE: NORMAL
VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PHASE
VOLTAGE / CURRENT / PH 2:
SPECIAL NEMA PLUG ARRANGEMENT:
POWER DENSITY:
OVERHEAD SERVICE CARRIER: N/A
ISOLATED GROUNDING: N/A
GROUND FAULT PROTECTION: N/A
WEATHER PROOF COVER: N/A
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
TYPE IP RATING HERE:
RACEWAY: YES
PLUG SPACING:
FLOOR BOX W TRENCH: NO
OTHER / COMMENTS: WIREMOLD ABOVE WORKBENCHES
CORD REELS SUSPENDED FROM CEILING

LIGHTING
SPECIALIZED LIGHTING: NO
SPECIALIZED CONTROL: NO
MOUNT: PENDANT CEILING
FIXTURE OUTPUT: DIRECT
LIGHT LEVEL (LUX):
LIGHT COLOUR TEMP (KELVIN): 4000
DIMMING SYSTEM: YES
WHITE TUNING:
TASK LIGHTING: YES
SCENE/ZONE CONTROL: YES
OCCUPANCY SENSORS: YES
NIGHT LIGHT: YES
DAYLIGHT CONTROL: NO
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
SAFETY LIGHTS: NO
A/V EQUIPMENT INTERFACE: NO
OTHER / COMMENTS:
MAX 2 LIGHTING ZONES

COMMUNICATIONS
PHONE: N/A
CELLULAR COMMUNICATION:
PUBLIC PAGING: YES
INTERCOM: NO
DATA TYPE / POINTS: COPPER RJ45
DATA PLUG SPACING:
WIRELESS: YES
CABLE TRAY TYPE:
OTHER / COMMENTS:

SECURITY
CONNECTION TO CENTRAL MONITORING STATION:
CCTV:
EMERGENCY DISTRESS CALL:
FAIL-SAFE HARDWARE:
INTRUDER SYSTEM:
ACCESS CONTROL (OPTIONS BELOW)
-
-
-
-
SECURITY EQUIPMENT:
SECURITY ZONES:
OTHER / COMMENTS:
Refer to Appendix N - Protected B "RDS Security Input" document issued
by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 2.1	**RDS: 003-2**
DEPARTMENTS / GROUP NAME: TSB ENGINEERING LAB	SPACE TYPE: WORKSHOP		**SPACE NAME: TEAR DOWN WORKSHOP**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-530PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY TSB HIGH BAY — SECONDARY ADJACENCY PHOTO LAB — TERTIARY ADJACENCY WELDING		



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003-2

2.1 - TEAR DOWN WORKSHOP

1 : 100

LEGEND

ARCHITECTURAL SYSTEMS

A30	FLAMMABLE STORAGE CABINET
A37	LARGE MOBILE TOOL CABINET
A95	MOBILE HYDRAULIC SCISSOR LIFT TABLE

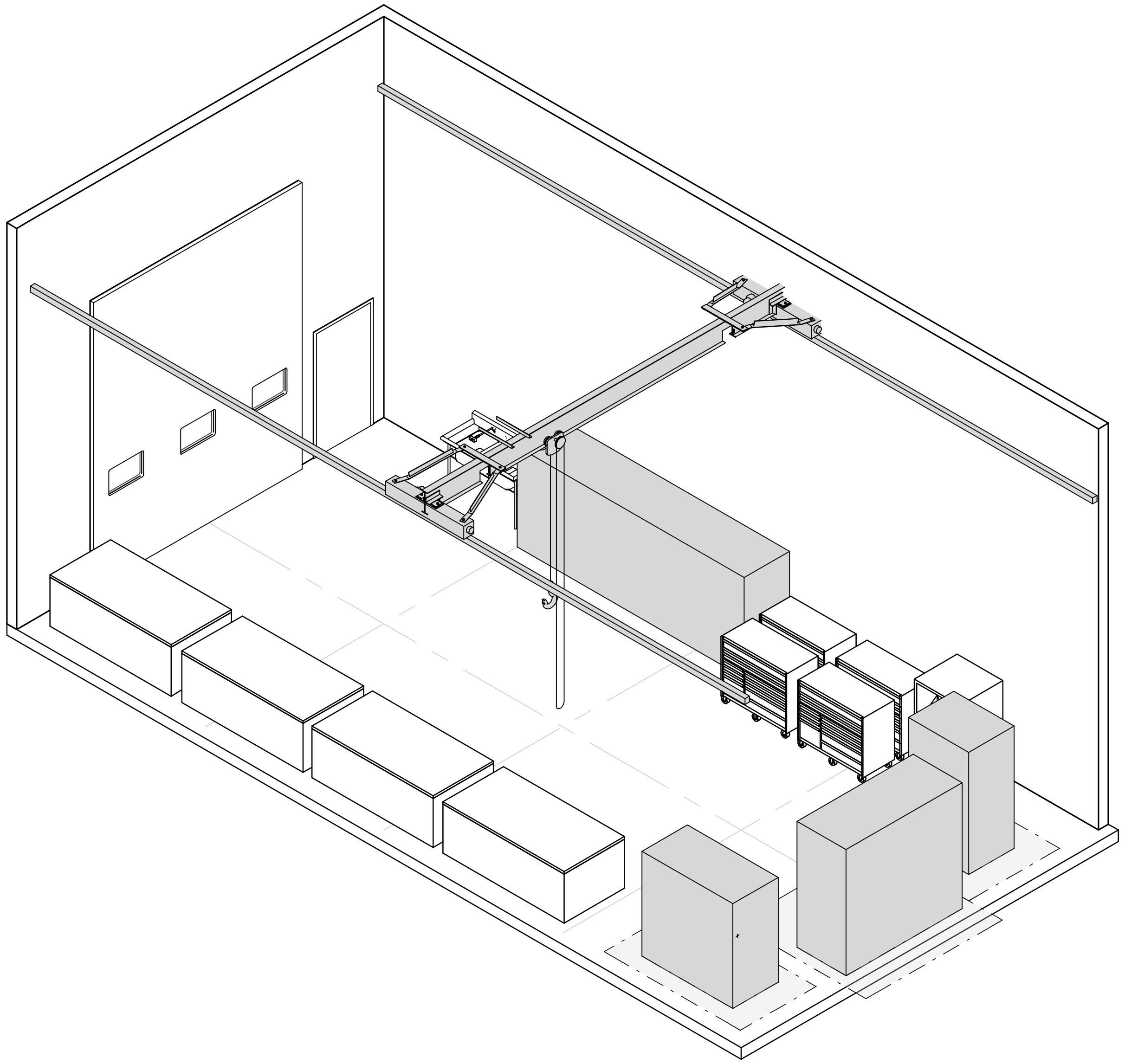
UTILITIES / SYSTEMS

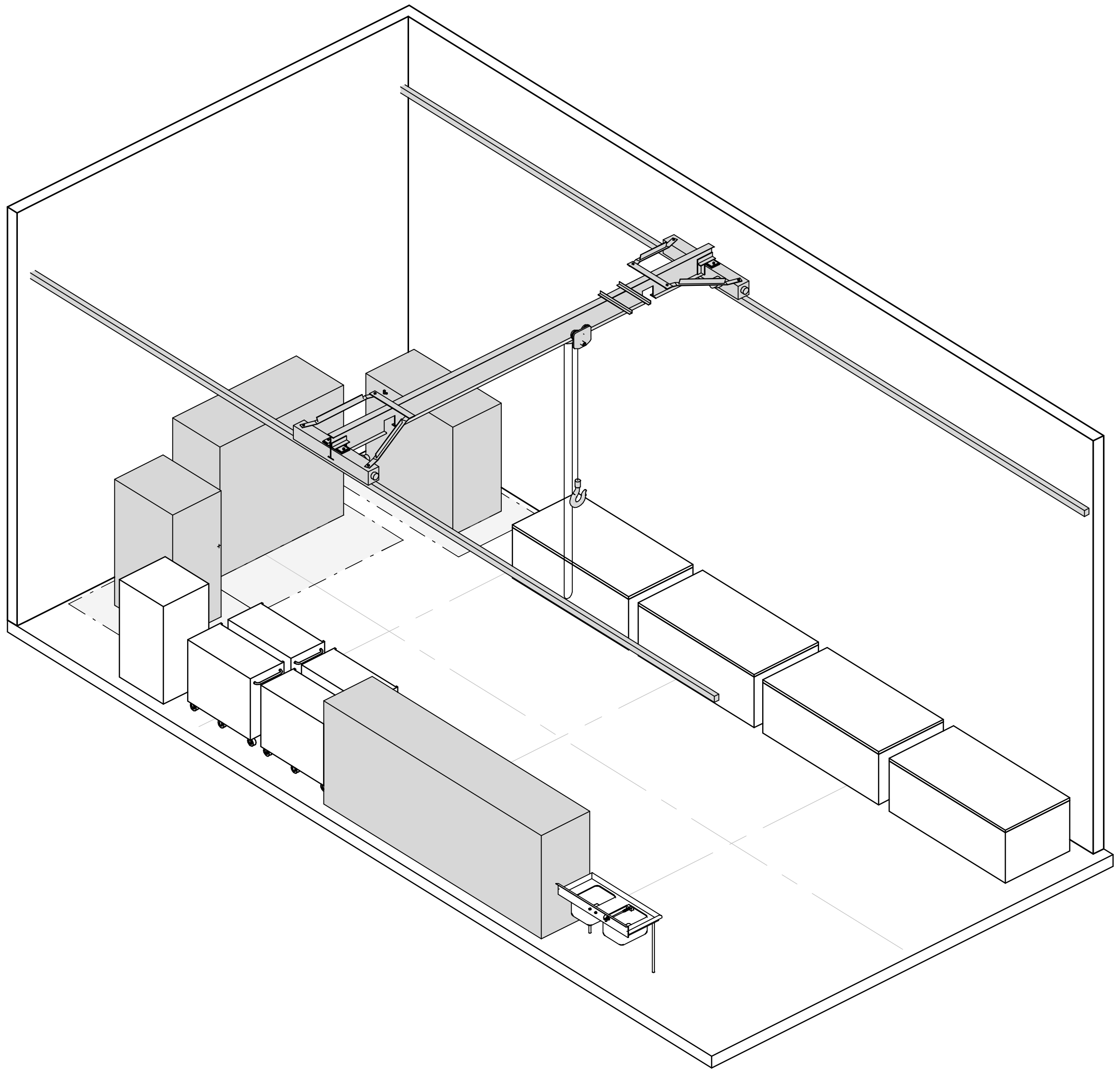
U30	HOT & COLD WATER, LAB
U38	EYEWASH
U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E80	HYDRAULIC TEST BENCH
E142	HYDRAULIC PRESS
E143	PARTS CLEANER SYSTEM
E144	ENGINE TOOLS
E503	1.5t TWO AXIS CHAIN HOIST

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 2.1		**RDS: 003-3**
DEPARTMENTS / GROUP NAME: TSB ENGINEERING LAB	SPACE TYPE: WORKSHOP	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: TEAR DOWN WORKSHOP**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-530PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY TSB HIGH BAY — SECONDARY ADJACENCY PHOTO LAB — TERTIARY ADJACENCY WELDING			





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: WORKSHOP	SPACE ID#: 2.2	RDS-004-1
CHIEF SCIENTIST: Rick Kearsey & Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 48.60	Space Name: MATERIAL TESTING PREP SHOP
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 24 HOURS	SPECIE USE: N/A	
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Room where materials get prepared for further testing/analysis. Open area for equipment and work surfaces are required. To be utilized by TSB & NRC, department/group name: ARC-SMPL/SI,HTM.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND PAINTED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE: NOT REQUIRED
- OTHER / COMMENTS:
- CONCRETE HARDENER / EPOXY COATING
- PREFERRED VENDOR(S): NA

FLOOR BASE
- TYPE: EPOXY
- INTEGRAL COVE: YES
- OTHER / COMMENTS:
- HIGH IMPACT RESISTANCE / OILS AND CHEMICAL RESISTANCE
- PREFERRED VENDOR(S): NA

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING: NO
- IMPRACT RESISTANT: YES
- WATER RESISTANT: YES
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE: N/A
- WALL FINISH: PAINT
- OTHER / COMMENTS:
- CMU FULL HEIGHT
- PREFERRED VENDOR(S): NA

PRIMARY CONTAINMENT DEVICE
- PC DEVICE: N/A
- PC DEVICE: N/A
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m²):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: TO STRUCTURE
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE:
- PRESSURE PERFORMANCE: N/A
- OTHER / COMMENTS:
- PREFERRED VENDOR(S): NA

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION: NO
- SURFACE DECONTAMINATION: NO
- FIRE EXTINGUISHER CABINET: YES
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: NO
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: STAINLESS STEEL
- OTHER / COMMENTS: MOBILE STORAGE CABINET, COUNTER, SS SHELVES
- 8 DRAWER STORAGE UNIT, WORKBENCH
- PREFERRED VENDOR(S): NA
- CHEMICAL STORAGE: NO
- ACID: NO
- BASE: NO
- FLAMMABLE LIQUIDS: NO
- STORAGE CABINET: YES
- STORAGE DRAWER UNIT: YES
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS: YES
- OPERABLE: NO
- SAFETY GLAZING: YES
- SAFETY ETCHING: NO
- SHADE CONTROL: NO
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm X 2150 mm
- SECONDARY LEAF (IF APPLICABLE): 900 mm X 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE: (OTHER-DEFINE)
- ARMOUR PLATE: N/A
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL: YES
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS: NO
- DOOR JAMB GUARDS: NO
- OTHER / COMMENTS:
- HMI FOR EXTERIOR, HM FIRE RATED AT SEPARATIONS
- PREFERRED VENDOR(S): NA

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: (OTHER-DEFINE)
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:
- - EXTRACTION ARM EXHAUST
- - PAINT BOOTH EXHAUST IS DEDICATED, SPARK RESISTANT CONSTRUCTION AND MANUAL ACTIVATION

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: YES (UTILITY/LAB)
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES:

PLUMBING

FIXTURES
- SINK TYPES: SS DOUBLE BASIN
- SINK DEPTH:
- SINK COUNTS: 1
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP: NO
- PEGBOARD: NO
- FAUCET TYPE: MIXING, SWING SPOUT, DECK MOUNTED
- PIPING MATERIAL:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
- OTHER:

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH (mm):
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM:
- EFFLUENT pH CONTROL:
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- **HAZARD 1**
- CHEMICAL, SMALL AMOUNTS
- **HAZARD 2**
- BIOLOGICAL - BLOOD, POSSIBLE TRACES OF HUMAN REMAINS
- **HAZARD 3**

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

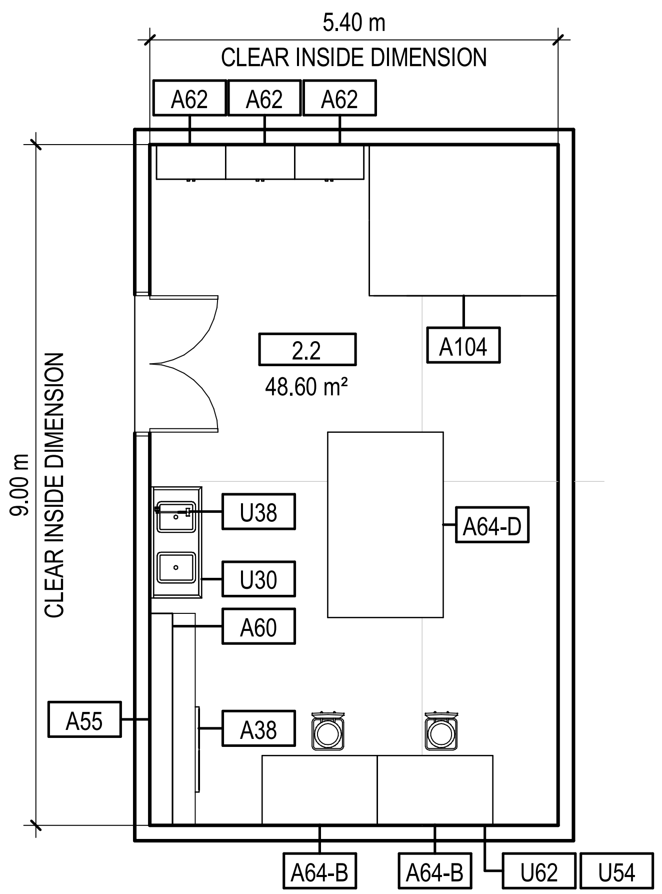
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PHASE
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH:
- OTHER / COMMENTS:

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM: NO
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 2.2	**RDS: 004-2**
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: WORKSHOP		**SPACE NAME: MATERIAL TESTING PREP SHOP**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 24 HOURS	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MATERIAL AND COMPONENT TESTING — SECONDARY ADJACENCY: — TERTIARY ADJACENCY:		



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004-2

2.2 - MATERIAL TESTING PREP SHOP

1 : 100

LEGEND

ARCHITECTURAL SYSTEMS

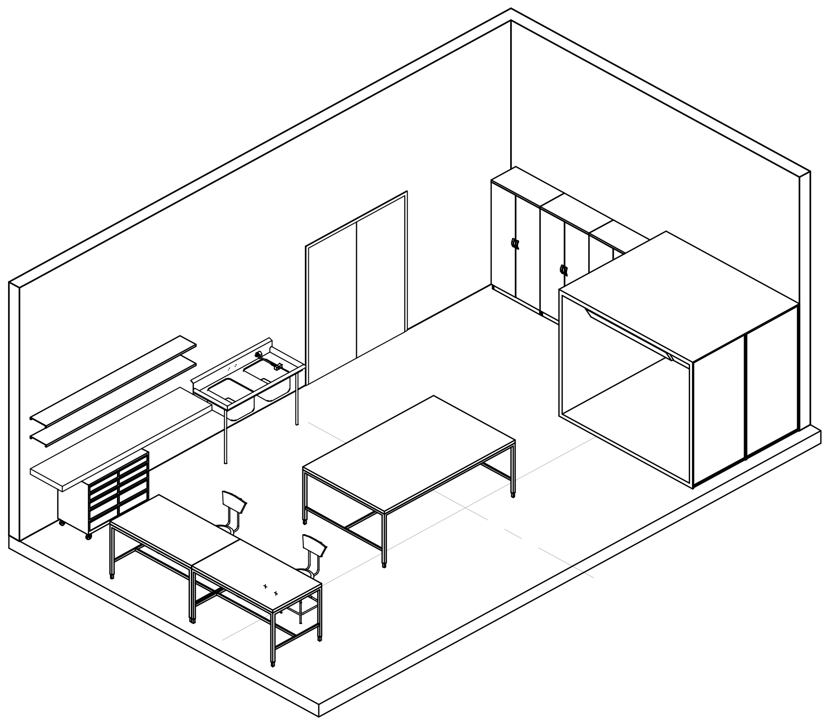
A38	MOBILE STORAGE CABINET, DRAWERS
A55	COUNTER
A60	STAINLESS STEEL SHELVES
A62	STORAGE SHELVING, TALL, CLOSED
A64-B	WORKBENCH, HEAVY DUTY
A64-D	WORKBENCH, MOBILE - 5'x8'
A104	PAINT BOOTH

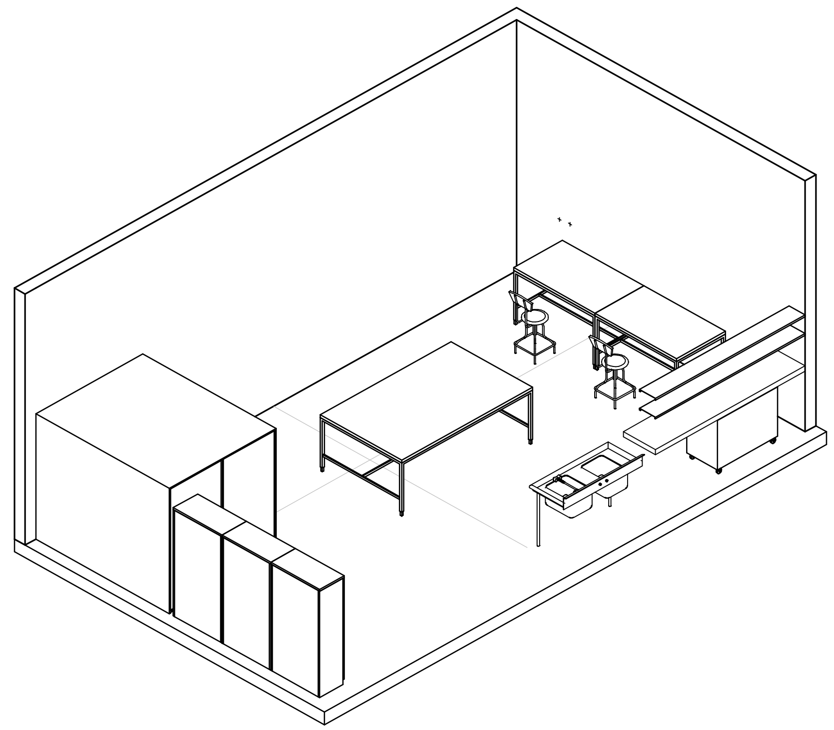
UTILITIES / SYSTEMS

U30	HOT & COLD WATER, LAB
U38	EYEWASH
U54	POWER, 120V., WIREWAY
U62	DATA, WIREWAY

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 2.2	**RDS: 004-3**
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: WORKSHOP	LAB CERTIFICATION REQUIREMENTS:	**SPACE NAME: MATERIAL TESTING PREP SHOP**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 24 HOURS		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MATERIAL AND COMPONENT TESTING — SECONDARY ADJACENCY — TERTIARY ADJACENCY		





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: WORKSHOP	SPACE ID#: 2.3	RDS-005-1
CHIEF SCIENTIST: Rick Kearsey & Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 64.80	Space Name: INSTRUMENTATION WORKSHOP
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 9AM-5PM	SPECIE USE: N/A	
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Room where electronic equipment/components are disassembled. Calibration and testing of sensors may also occur here. Open area for equipment and work surfaces are required. To be utilized by TSB & NRC.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE: YES (MANDATORY)
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING: YES
- IMPRACT RESISTANT: YES
- WATER RESISTANT: NO
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE: N/A
- WALL FINISH: PAINT
- OTHER / COMMENTS:
- CMU FULL HEIGHT
- PREFERRED VENDOR(S): NA

PRIMARY CONTAINMENT DEVICE
- PC DEVICE: N/A
- PC DEVICE: N/A
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE: N/A
- OTHER / COMMENTS:
- PREFERRED VENDOR(S): NA

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION: NO
- SURFACE DECONTAMINATION: NO
- FIRE EXTINGUISHER CABINET: YES
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: YES
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: STAINLESS STEEL
- OTHER / COMMENTS: MOBILE TOOL CABINET, CLOSED STORAGE SHELVING
- 8 DRAWER STORAGE UNIT, WORKBENCH
- PREFERRED VENDOR(S): NA
- CHEMICAL STORAGE: NO
- ACID: NO
- BASE: NO
- FLAMMABLE LIQUIDS: NO
- STORAGE CABINET: YES
- STORAGE DRAWER UNIT: YES
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:
- PREFERRED VENDOR(S): NA

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS: NO
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm X 2150 mm
- SECONDARY LEAF (IF APPLICABLE): 900 mm X 2150 mm
- VISION PANEL: N/A
- LOCKSET TYPE: (OTHER-DEFINE)
- ARMOUR PLATE: N/A
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL: YES
- DOOR INTERLOCK: NOT APPLICABLE
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS: NO
- DOOR JAMB GUARDS: NO
- OTHER / COMMENTS:
- HMI FOR EXTERIOR, HM FIRE RATED AT SEPARATIONS
- PREFERRED VENDOR(S): NA
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: EXTRACTION ARM
- MECHANICAL NOISE (DECIBELS / NC): NC50
- COMMENTS: EXTRACTION ARM SUITABLE FOR SOLDERING AND LIGHT SMOKE APPLICATION

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: YES (UTILITY)
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES:

PLUMBING

FIXTURES
- SINK TYPES: SS DOUBLE BASIN
- SINK DEPTH:
- SINK COUNTS: 1
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP: NO
- PEGBOARD: NO
- FAUCET TYPE: MIXING, SWING SPOUT, DECK MOUNTED
- PIPING MATERIAL:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
- OTHER:

DRAINS / VENTS
- FLOOR DRAIN: SINGLE POINT
- TRAP DEPTH: 75mm OR 100mm
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM:
- EFFLUENT pH CONTROL:
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):

HAZARD 1
- CHEMICAL, SMALL AMOUNTS

HAZARD 2

HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

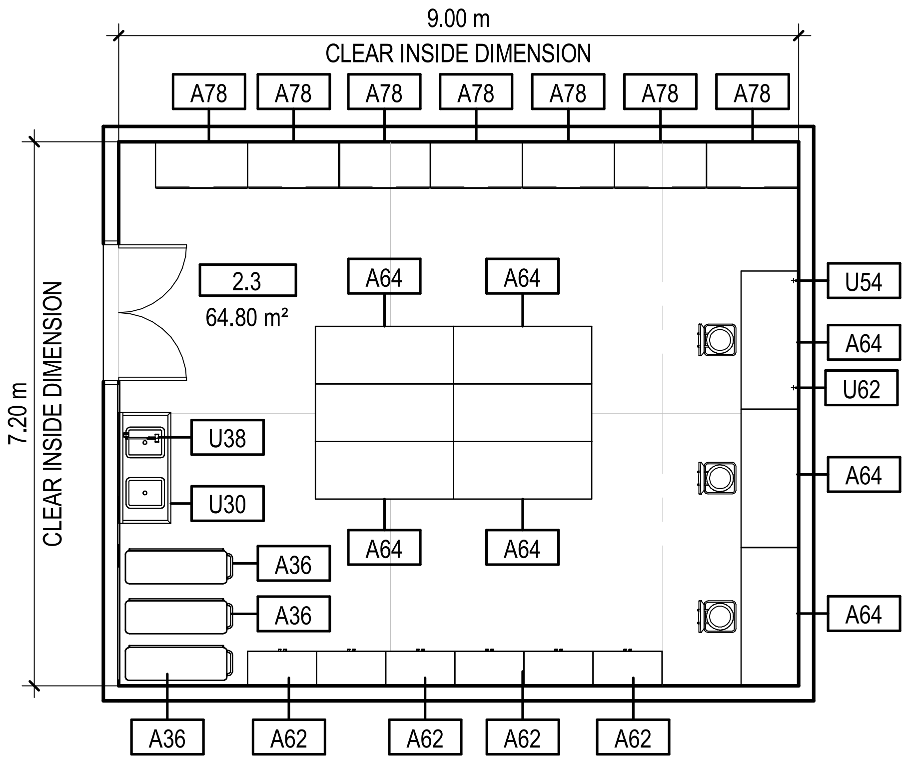
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: YES
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: YES
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- WIREMOLD ABOVE WORKBENCHES

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS:
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:
- WIREMOLD ABOVE WORKBENCHES

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 2.3	**RDS: 005-2**
DEPARTMENTS / GROUP NAME: TSTS (SMPL & TSB)	SPACE TYPE: WORKSHOP		**SPACE NAME: INSTRUMENTATION WORKSHOP**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 9AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY: NRC BAY, MATERIAL COMPONENT TESTING — TERTIARY ADJACENCY		



2.3 - INSTRUMENTATION WORKSHOP

1 / 005-2

1 : 100

LEGEND

ARCHITECTURAL SYSTEMS

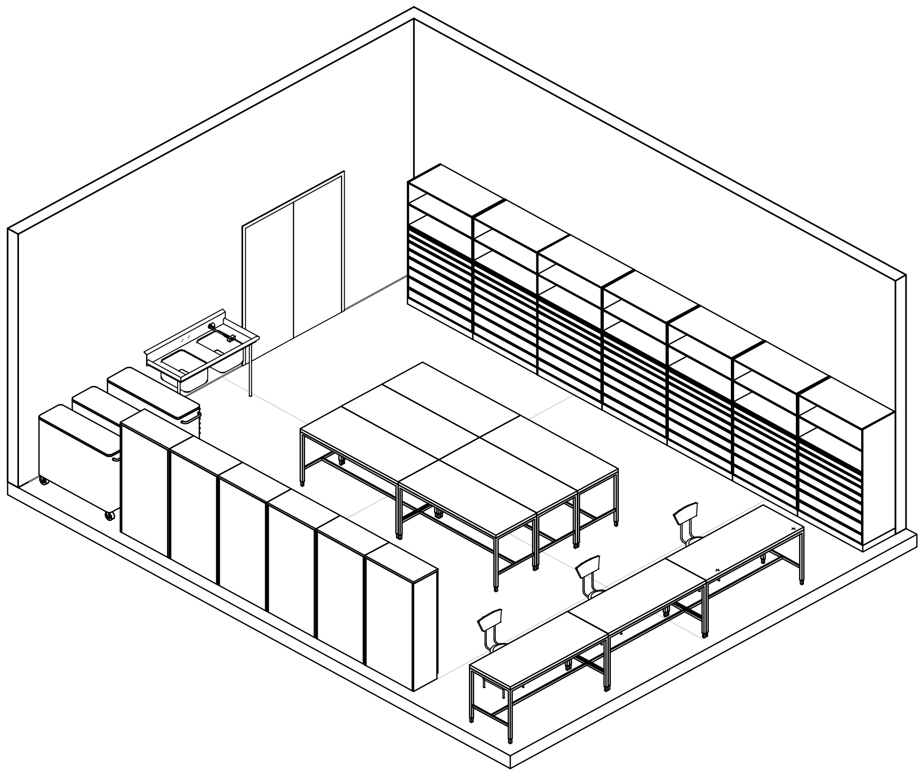
A36	MOBILE TOOL CABINET
A62	STORAGE SHELVING, TALL, CLOSED
A64	WORKBENCH, MOBILE
A78	STORAGE UNIT, 8 DRAWER

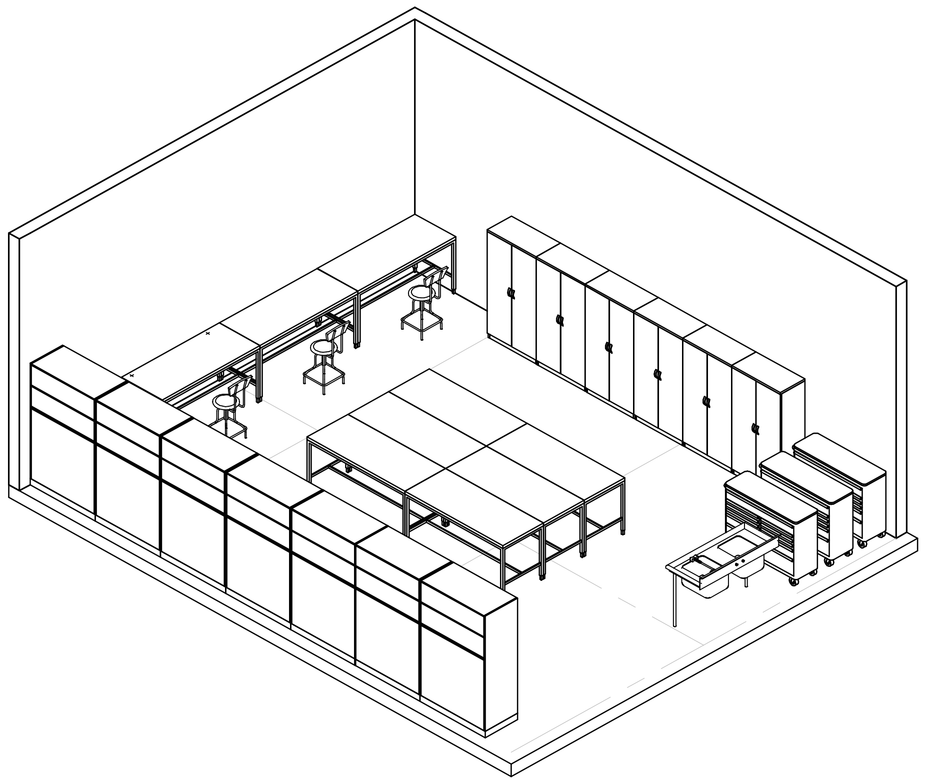
UTILITIES / SYSTEMS

U30	HOT & COLD WATER, LAB
U38	EYEWASH
U54	POWER, 120V., WIREWAY
U62	DATA, WIREWAY

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 2.3	**RDS: 005-3**
DEPARTMENTS / GROUP NAME: TSTS (SMPL & TSB)	SPACE TYPE: WORKSHOP	LAB CERTIFICATION REQUIREMENTS:	**SPACE NAME: INSTRUMENTATION WORKSHOP**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 9AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY: NRC BAY, MATERIAL COMPONENT TESTING — TERTIARY ADJACENCY		





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: WORKSHOP	SPACE ID#: 2.4	**RDS-006-1**
CHIEF SCIENTIST: Rick Kearsey & Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 77.76	**Space Name:**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 9AM-5PM	SPECIE USE: N/A	**WOOD WORKSHOP**
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES: Room where wood pieces/elements are manufactured. Open area for equipment and work surfaces are required. To be utilized by NRC.			

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE: NOT REQUIRED
- OTHER / COMMENTS:
- CONCRETE HARDENER / SEALER
- PREFERRED VENDOR(S): NA

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE: YES
- OTHER / COMMENTS:
- PREFERRED VENDOR(S): NA

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING: NO
- IMPRACT RESISTANT: YES
- WATER RESISTANT: NO
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE: N/A
- WALL FINISH: PAINT
- OTHER / COMMENTS:
- CMU FULL HEIGHT
- ALL WALLS ADJACENT TO THE HIGH BAY SHALL BE BULLET PROOF
- PREFERRED VENDOR(S): NA

PRIMARY CONTAINMENT DEVICE
- PC DEVICE: N/A
- PC DEVICE: N/A
- OTHER / COMMENTS:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m²):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: TO STRUCTURE
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE: N/A
- OTHER / COMMENTS:
- 7m CLEAR TO UNDERSIDE OF STRUCTURE
- PREFERRED VENDOR(S): NA

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION: NO
- SURFACE DECONTAMINATION: NO
- FIRE EXTINGUISHER CABINET: YES
- CRANE SUPPORT: YES
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE:
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: STAINLESS STEEL
- OTHER / COMMENTS: WORKBENCH
- PREFERRED VENDOR(S): NA
- CHEMICAL STORAGE: NO
- ACID: NO
- BASE: NO
- FLAMMABLE LIQUIDS: NO
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:
- PREFERRED VENDOR(S): NA

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: REQUIRED
- WINDOWS: YES
- OPERABLE: NO
- SAFETY GLAZING: YES
- SAFETY ETCHING: NO
- SHADE CONTROL: YES
- OTHER / COMMENTS: ALL GLAZING ADJACENT TO HIGH BAY SHALL BE BULLET PROOF
- PREFERRED VENDOR(S): NA

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm X 2150 mm
- SECONDARY LEAF (IF APPLICABLE): 900 mm X 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE: (OTHER-DEFINE)
- ARMOUR PLATE: N/A
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL: YES
- DOOR INTERLOCK: NOT APPLICABLE
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS: NO
- DOOR JAMB GUARDS: NO
- OTHER / COMMENTS:
- HMI FOR EXTERIOR, HM FIRE RATED AT SEPARATIONS
- PREFERRED VENDOR(S): NA

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: DUST EXTRACTION SYSTEM
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQUIPMENT EXHAUST:
- MECHANICAL NOISE (DECIBELS / NC): NC50
- COMMENTS: - DUST EXTRACTION SYSTEM SUITABLE FOR WOODWORKING DEBRIS AND DUST

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: YES (UTILITY)
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES:

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
- COMMENTS: EYEWASH TO BE STANDALONE WITH BOWL
- - DCW/DHW & SAN. CAPPED CONNECTIONS FOR FUTURE

DRAINS / VENTS
- FLOOR DRAIN:
- TRAP DEPTH (mm):
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM:
- EFFLUENT pH CONTROL:
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

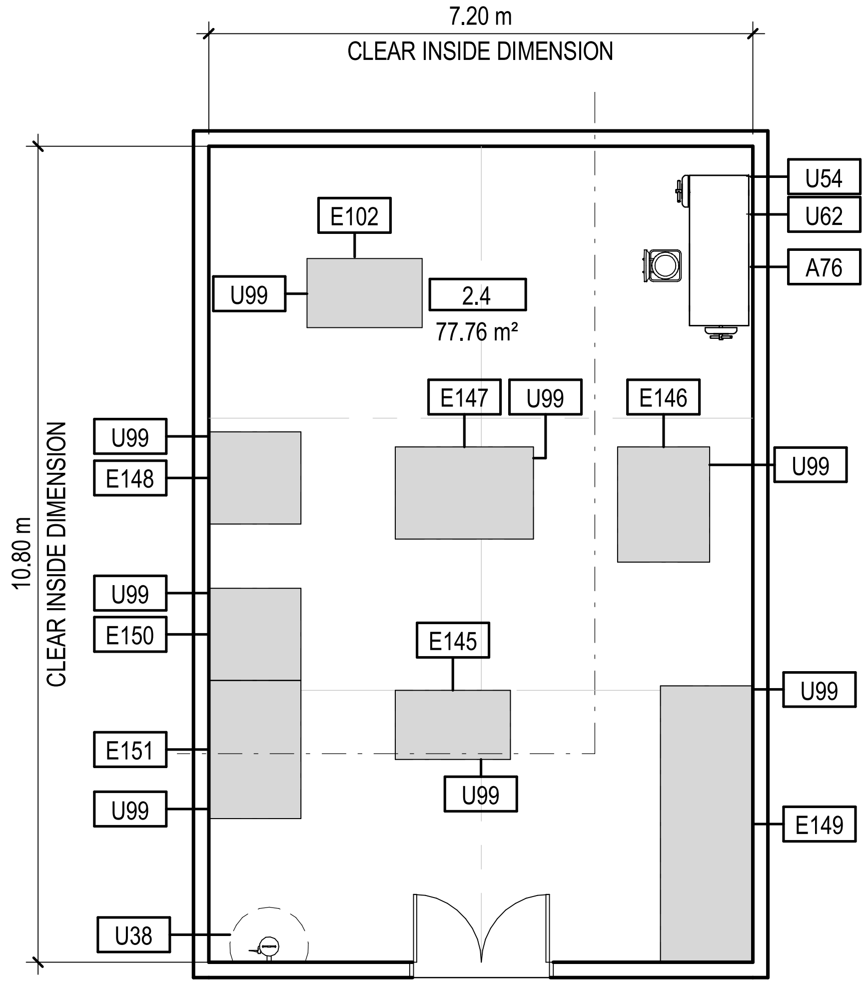
ELECTRICAL / POWER
- CLASS TYPE:
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PHASE
- VOLTAGE / CURRENT / PH 2: 600V / XXX / 3 PHASE
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: YES
- OTHER / COMMENTS:
- EPO BUTTON BY DOOR

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM: NO
- DATA TYPE / POINTS: N/A
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 2.4	RDS: 006-2
DEPARTMENTS / GROUP NAME: TSTS (SMPL & TSB)	SPACE TYPE: WORKSHOP		SPACE NAME: WOOD WORKSHOP
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 9AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY MACHINE WORKSHOP — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



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006-2

2.4 - WOOD WORKSHOP

1 : 100

LEGEND

ARCHITECTURAL SYSTEMS

A76	WORKBENCH, WOODWORKING

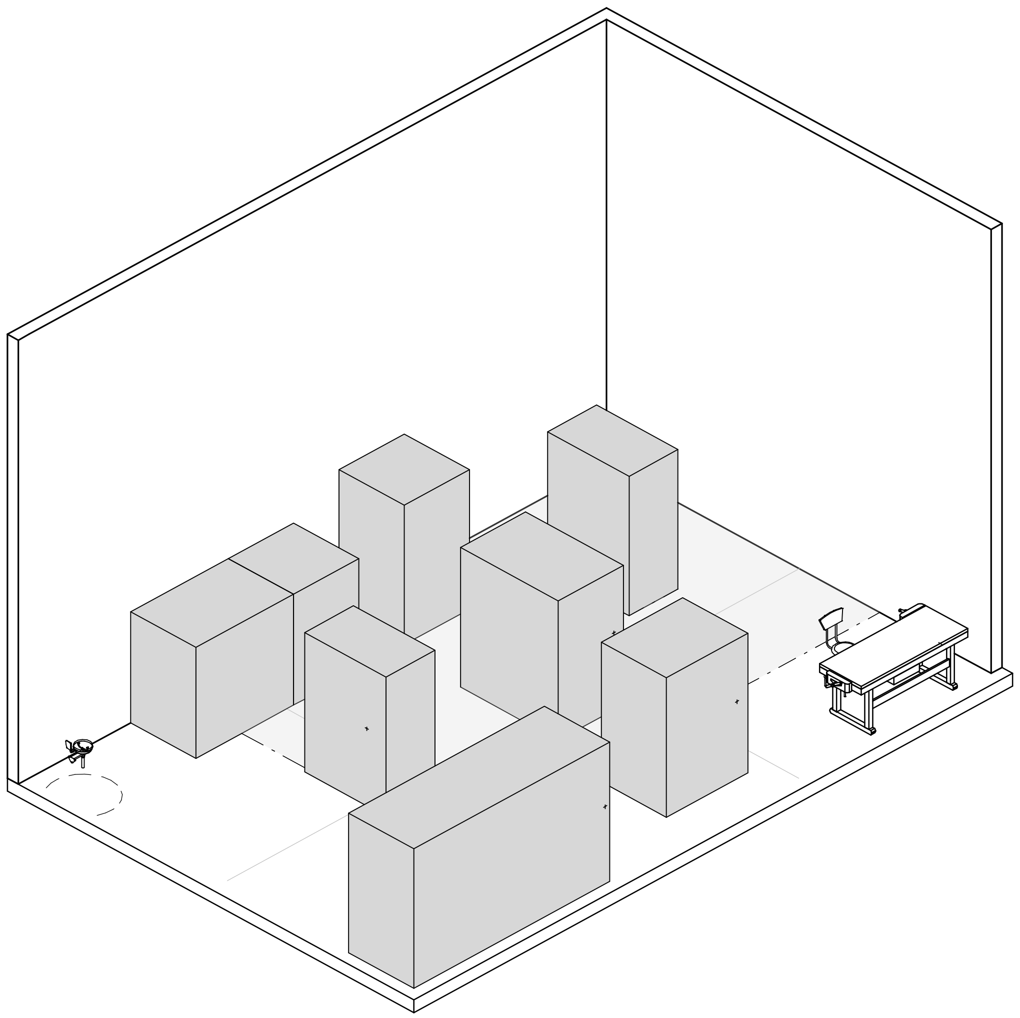
UTILITIES / SYSTEMS

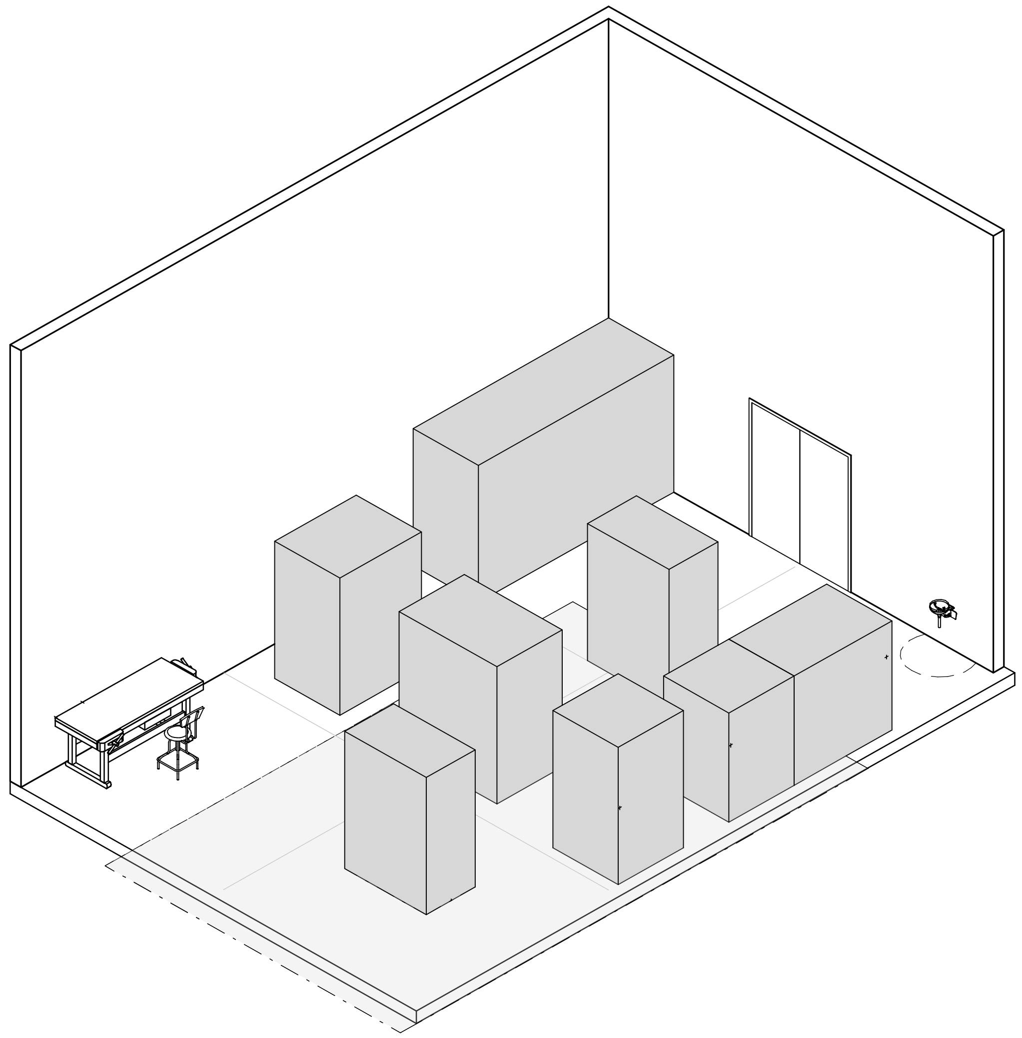
U38	EYEWASH
U54	POWER, 120V., WIREWAY
U62	DATA, WIREWAY
U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E102	VERTICAL BAND SAW + OTHERS
E145	THICKNESS PLANNER
E146	6" JOINTER
E147	TABLE SAW
E148	MITER SAW
E149	VERTICAL CUTTING SAW
E150	STORAGE CABINET
E151	WOOD STORAGE RACK

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 2.4		**RDS: 006-3**
DEPARTMENTS / GROUP NAME: TSTS (SMPL & TSB)	SPACE TYPE: WORKSHOP			**SPACE NAME: WOOD WORKSHOP**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 9AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MACHINE WORKSHOP — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 9, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: WORKSHOP	SPACE ID#: 2.5	RDS-007-1
CHIEF SCIENTIST: Rick Kearsey & Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 503.50 + 12.68 = 516.18	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 730AM-5PM	SPECIE USE: N/A	MACHINE WORKSHOP
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Room where machinists use machine tools and cutting tools to make parts, usually metal. Custom engineering and fabrication. Open area for equipment and work surfaces are required. To be utilized by TSB & NRC.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE: NOT REQUIRED
- OTHER / COMMENTS:
- HARDENER / SEALER
- PREFERRED VENDOR(S): NA

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE: YES
- OTHER / COMMENTS:
- PREFERRED VENDOR(S): NA

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING: NO
- IMPRACT RESISTANT: YES
- WATER RESISTANT: NO
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE: N/A
- WALL FINISH: PAINT
- OTHER / COMMENTS:
- CMU FULL HEIGHT
- PREFERRED VENDOR(S): NA

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: TO STRUCTURE
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE: N/A
- OTHER / COMMENTS:
- 7m CLEAR TO UNDERSIDE OF STRUCTURE
- PREFERRED VENDOR(S):

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION: NO
- SURFACE DECONTAMINATION: NO
- FIRE EXTINGUISHER CABINET: YES
- CRANE SUPPORT: YES
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: YES
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: STAINLESS STEEL
- OTHER / COMMENTS: ADJUSTABLE HEIGHT WORKBENCH,
- MOBILE TOOL CABINET
- PREFERRED VENDOR(S):
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: YES
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: YES
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: REQUIRED
- WINDOWS: YES
- OPERABLE: NO
- SAFETY GLAZING: YES
- SAFETY ETCHING:
- SHADE CONTROL: YES
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm X 2150 mm
- SECONDARY LEAF (IF APPLICABLE): 900 mm X 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE: (OTHER-DEFINE)
- ARMOUR PLATE: N/A
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL: YES
- DOOR INTERLOCK: NOT APPLICABLE
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS: NO
- DOOR JAMB GUARDS: NO
- OTHER / COMMENTS:
- HMI FOR EXTERIOR, HM FIRE RATED AT SEPARATIONS
- PREFERRED VENDOR(S):

- DOOR TYPE: OVERHEAD DOOR
- PRIMARY LEAF: 4200 mm X 5000 mm
- SECONDARY LEAF (IF APPLICABLE):
- VISION PANEL: PRIMARY LEAF
- LOCKSET TYPE: N/A
- ARMOUR PLATE: N/A
- KICK PLATE: N/A
- ACCESS CONTROL: YES
- DOOR INTERLOCK: NOT APPLICABLE
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS: NO
- DOOR JAMB GUARDS: NO
- OTHER / COMMENTS:
- OTHER / COMMENTS: STEEL BOLLARDS
- PREFERRED VENDOR(S): NA

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: CANOPY HOOD EXHAUST
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQUIPMENT EXHAUST:
- MECHANICAL NOISE (DECIBELS / NC): NC50
- COMMENTS: - DEDICATED LOCAL EXTRACTION HOOD FOR E40 AND E94.
- EXTRATION ARM ADJACENT GRINDER E170.
- EXHAUST CONNECTION FROM E94 VACUUM TO E84.

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: YES
- STEAM: NO
- COMP. AIR: YES (UTILITY)
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:
- COMMENTS: - COMP. AIR THRU FLOOR TRENCHES OR WALL, NOT OVERHEAD
- TO ALLOW FOR UNRESTRICTED CRANE MOVEMENT.

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES:

PLUMBING

FIXTURES
- SINK TYPES: SS DOUBLE BASIN
- SINK DEPTH:
- SINK COUNTS: 1
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP: NO
- PEGBOARD: NO
- FAUCET TYPE: MIXING, SWING SPOUT, DECK MOUNTED
- PIPING MATERIAL:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
- OTHER: HOSE BIB AT SINK

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH (mm):
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM:
- EFFLUENT pH CONTROL:
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 12 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: 2 t overhead crane to serve CNC mill
- and large lathe at a minimum

ELECTRICAL / POWER

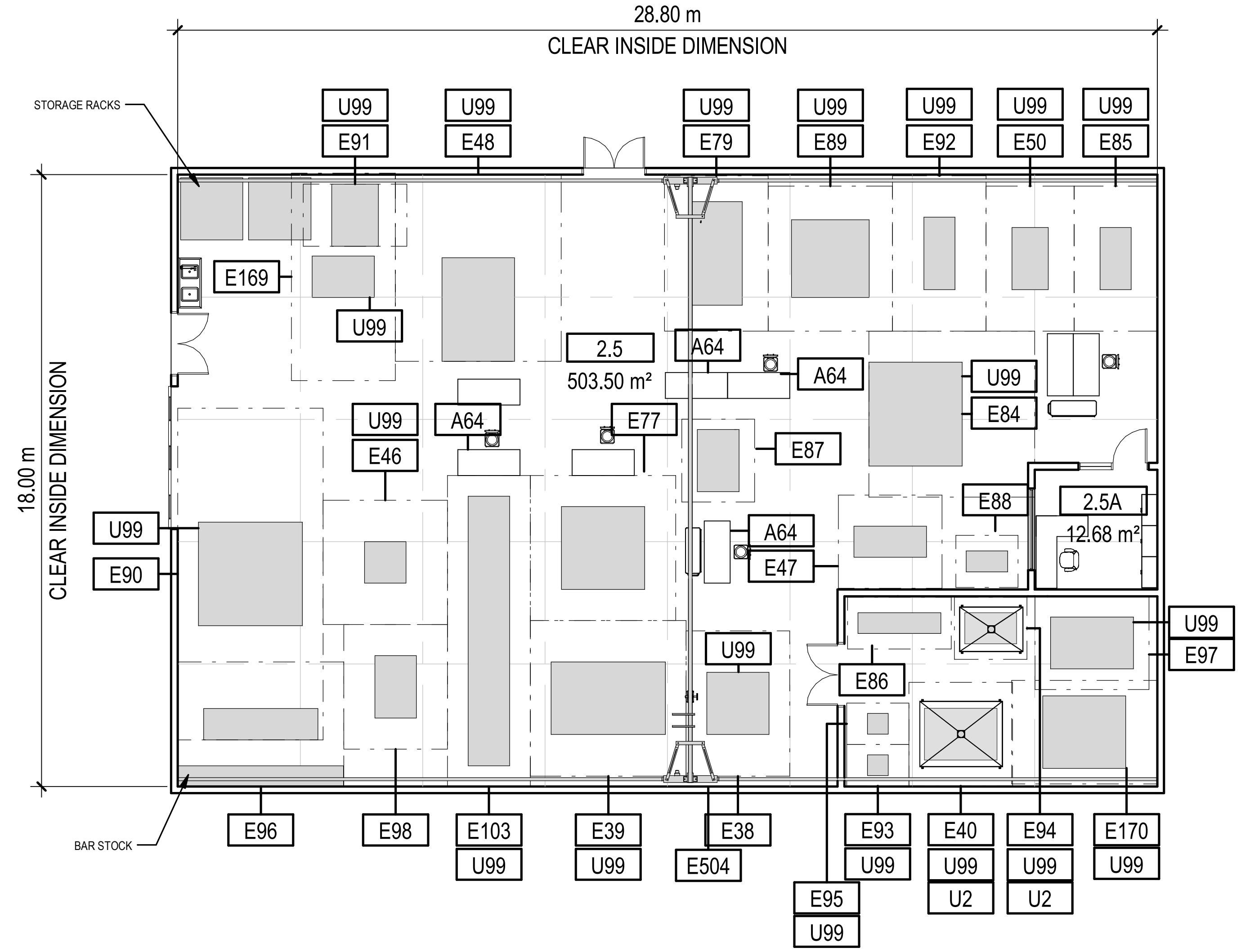
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 600V / XXX / 3 PHASE
- VOLTAGE / CURRENT / PH 2: 208V / XXX / 3 PHASE
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: YES
- PLUG SPACING:
- FLOOR BOX W TRENCH: YES
- OTHER / COMMENTS: EPO BUTTON AT DOORS
- FEED EQUIPMENT FROM FLOOR PEDESTALS
- LOCAL POWER PANELS IN THE ROOM

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: YES
- DAYLIGHT CONTROL: YES
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM: NO
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE: OPEN BASKET
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 9, 20/05/2021		SPACE ID #: 2.5	**RDS: 007-2**
DEPARTMENTS / GROUP NAME: TSTS HUB (SMPL & TSB)	SPACE TYPE: WORKSHOP		**SPACE NAME: MACHINE WORKSHOP**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 730AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: NRC & TSB HIGH BAY, WOOD WORKSHOP, WELDING WORKSHOP — SECONDARY ADJACENCY: MACHINE SHOP TOOL ROOM, MACHINE SHOP STORAGE — TERTIARY ADJACENCY		



2.5 - MACHINE WORKSHOP

1 / 007-2

1 : 200

LEGEND

ARCHITECTURAL SYSTEMS

A36	MOBILE TOOL CABINET
A64	WORKBENCH, MOBILE

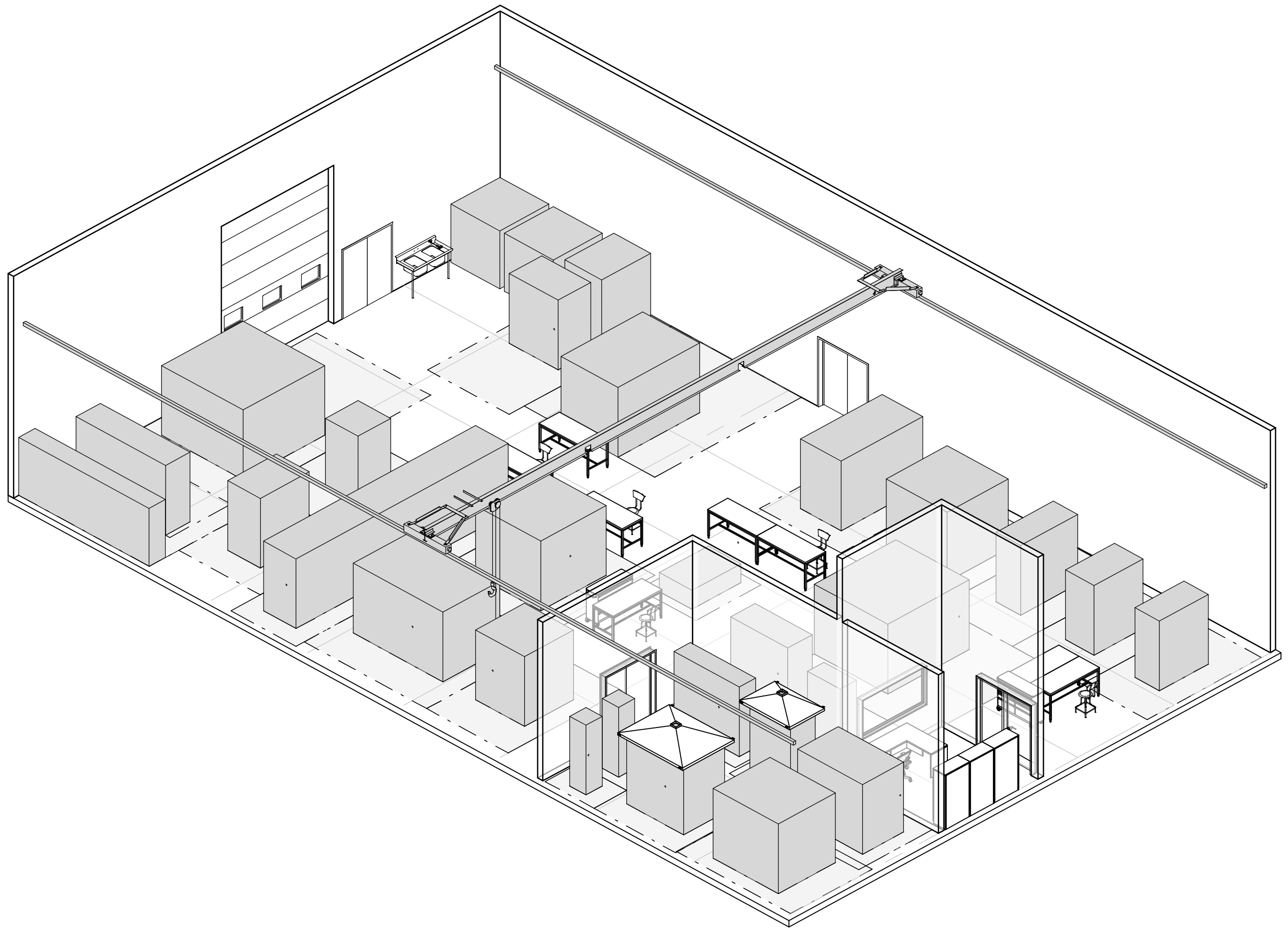
UTILITIES / SYSTEMS

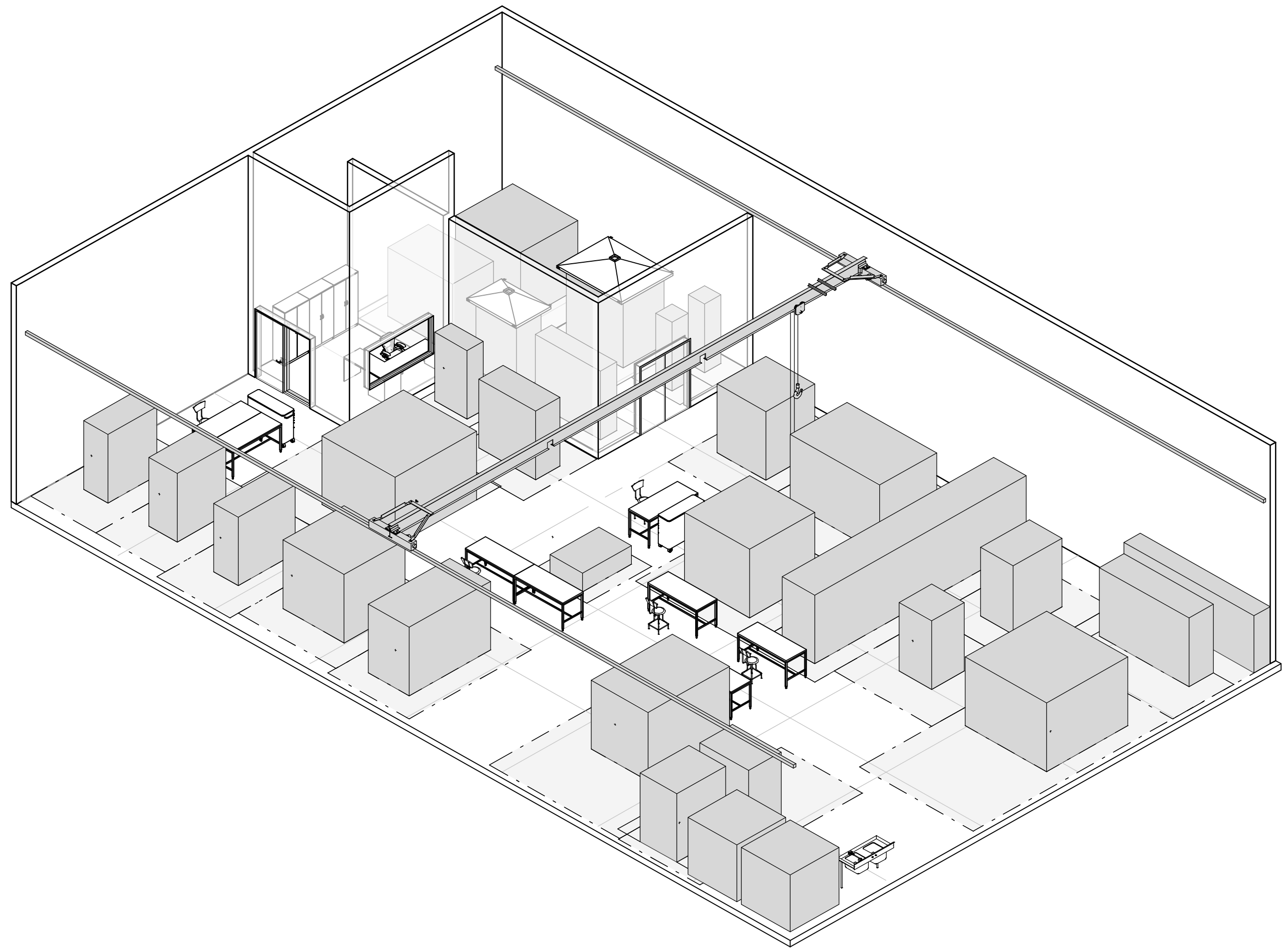
U2	CANOPY HOOD
U30	HOT & COLD WATER, LAB
U38	EYEWASH
U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E38	MILLING MACHINE VERTICAL, HITACHI	E94	VACUUM FOR MILLING CARBON
E39	MILLING MACHINE UNIVERSAL	E95	DRILL SHARPENER
E40	ELECTRIC DISCHARGE MACHINE	E96	SHEET METAL BREAKE
E46	DOALL CUT-OFF SAW WITH SILENCER	E97	SAND BLASTER
E47	TONE FAN RADIAL DRILLING MACHINE	E98	MANUAL METAL SHEAR
E48	HYDRAULIC SHEARER	E103	VARIOUS EQUIPMENT
E50	LATHE HARDINGE, SUPER PRECISION	E169	VERTICAL BAND SAW - STARTRITE MODEL 30-R-10
E77	MILLING MACHINE	E170	SURFACE GRINDER
E79	LATHE	E504	2t OVERHEAD CRANE
E84	CNC MILLING MACHINE		
E85	HARDINGE LATHE		
E86	GRINDER - ROBBINS & MUER		
E87	DRILL MACHINE - ARBOGA A2608		
E88	ENERPAC PRESS		
E89	HAAS TL1 - CNC LATHE		
E90	DOALL VERTICAL BAND SAW		
E91	HORIZONTAL BAND SAW - STARTRITE		
E92	MONARCH LATHE		
E93	GREEN GRINDER		

REVISION # & ISSUE DATE: REV 9, 20/05/2021		SPACE ID #: 2.5		**RDS: 007-3**
DEPARTMENTS / GROUP NAME: TSTS HUB (SMPL & TSB)	SPACE TYPE: WORKSHOP	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: MACHINE WORKSHOP**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 730AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: NRC & TSB HIGH BAY, WOOD WORKSHOP, WELDING WORKSHOP — SECONDARY ADJACENCY: MACHINE SHOP TOOL ROOM, MACHINE SHOP STORAGE — TERTIARY ADJACENCY:			





REVISION # & ISSUE DATE: REV 8, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: WORKSHOP	SPACE ID#: 2.6	RDS-008-1
CHIEF SCIENTIST: Rick Kearsey & Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 77.76	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 7AM-5PM	SPECIE USE: N/A	WELDING WORKSHOP
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Support activities of NRC/TSB High Bay labs as well as custom engineering and fabrication. Includes powdered metal canning activities. Requires space for a small vacuum/diffusion pump system, and open area for equipment and work surfaces. To be utilized by TSB & NRC.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE: NOT REQUIRED
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE: YES
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING: NO
- IMPRACT RESISTANT: YES
- WATER RESISTANT: NO
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE: N/A
- WALL FINISH: PAINT
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: TO STRUCTURE
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE: N/A
- OTHER / COMMENTS:
- 7m CLEAR TO UNDERSIDE OF STRUCTURE
- PREFERRED VENDOR(S):

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION: NO
- SURFACE DECONTAMINATION: NO
- FIRE EXTINGUISHER CABINET: YES
- CRANE SUPPORT: N/A
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE:
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: STAINLESS STEEL
- OTHER / COMMENTS: WORKBENCH, 8 DRAWER STORAGE UNIT
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: YES
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS: NO
- OPERABLE: NO
- SAFETY GLAZING: NO
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: SINGLE
- PRIMARY LEAF: 1100 m x 2150 mm
- SECONDARY LEAF (IF APPLICABLE):
- VISION PANEL: PRIMARY LEAF
- LOCKSET TYPE: (OTHER-DEFINE)
- ARMOUR PLATE: N/A
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL: YES
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS: NO
- DOOR JAMB GUARDS: NO
- OTHER / COMMENTS:
- DOOR TYPE: OVERHEAD DOOR
- PRIMARY LEAF: 3000 mm x 4200 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL: PRIMARY LEAF
- LOCKSET TYPE: N/A
- ARMOUR PLATE: N/A
- KICK PLATE: N/A
- ACCESS CONTROL: YES
- DOOR INTERLOCK: NOT APPLICABLE
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS: NO
- DOOR JAMB GUARDS: NO
- OTHER / COMMENTS: STEEL BOLLARDS
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: CANOPY HOOD EXHAUST
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: FUMEHOOD
- MECHANICAL NOISE (DECIBELS / NC): NC50
- COMMENTS: - CANOPY HOOD ABOVE WELDING TABLES, EXTRATION ARM
- ADJACENT HEAVY DUTY WORKBENCH A64-A.

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: YES
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: YES (UTILITY)
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: UHP ARGON
- COMMENTS: UHP ARGON GAS FOR GLOVE BOX

PLUMBING

FIXTURES
- SINK TYPES: SS DOUBLE BASIN
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
- OTHER:
- HOSE BIB AND POTENTIAL WATER DISTRIBUTION THRU TRENCH

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH (mm):
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM:
- EFFLUENT pH CONTROL:
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: Forklift access
- 1 T (2000 lbs) wall mounted jib crane

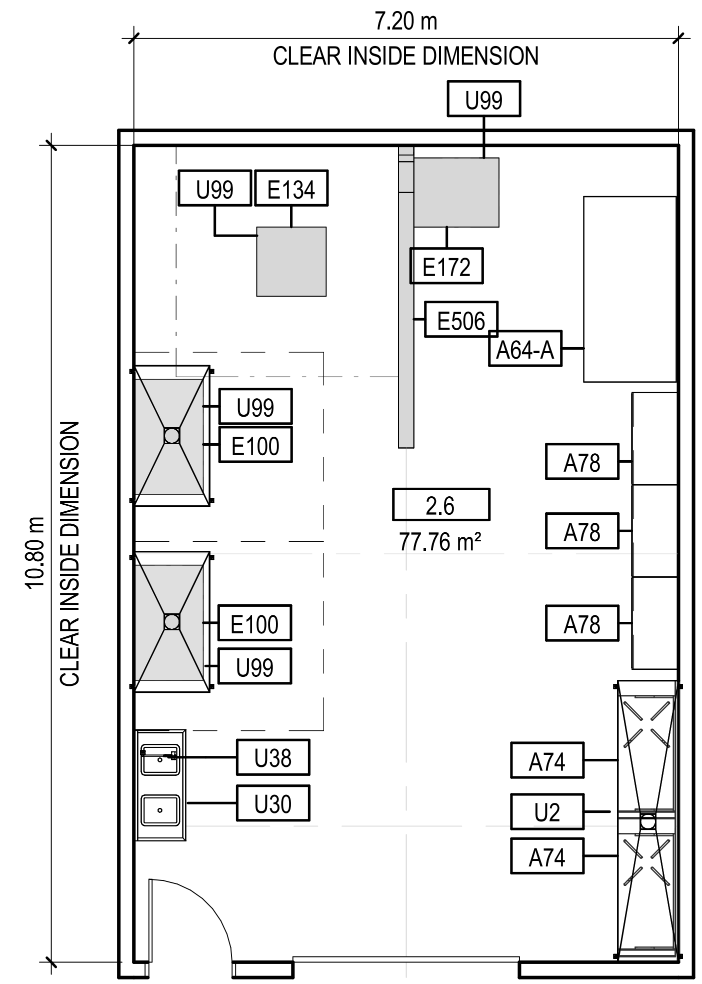
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 600V / XXX / 3 PHASE
- VOLTAGE / CURRENT / PH 2: 208V / XXX / 3 PHASE
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: YES
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- WIREMOLD ABOVE WORKBENCHES

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM: NO
- DATA TYPE / POINTS: N/A
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 8, 20/05/2021		SPACE ID #: 2.6	RDS: 008-2
DEPARTMENTS / GROUP NAME: TSTS (SMPL & TSB)	SPACE TYPE: WORKSHOP		SPACE NAME: WELDING WORKSHOP
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: NRC & TSB HIGH BAY, MACHINE WORKSHOP — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



1 008-2 2.6 - WELDING WORKSHOP
1 : 100

LEGEND

ARCHITECTURAL SYSTEMS

A64-A	WORKBENCH, MOBILE, HEAVY DUTY
A74	WORKBENCH WELDING
A78	STORAGE UNIT, 8 DRAWER

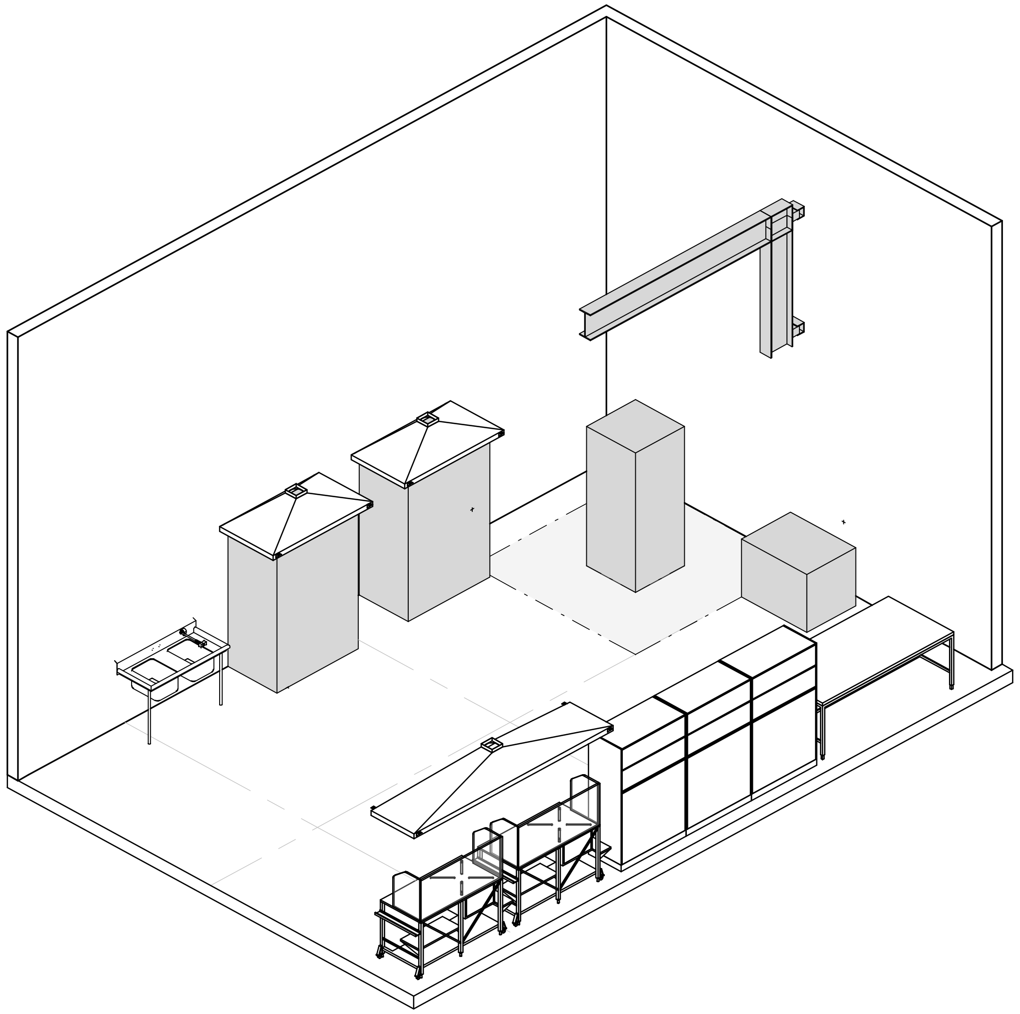
UTILITIES / SYSTEMS

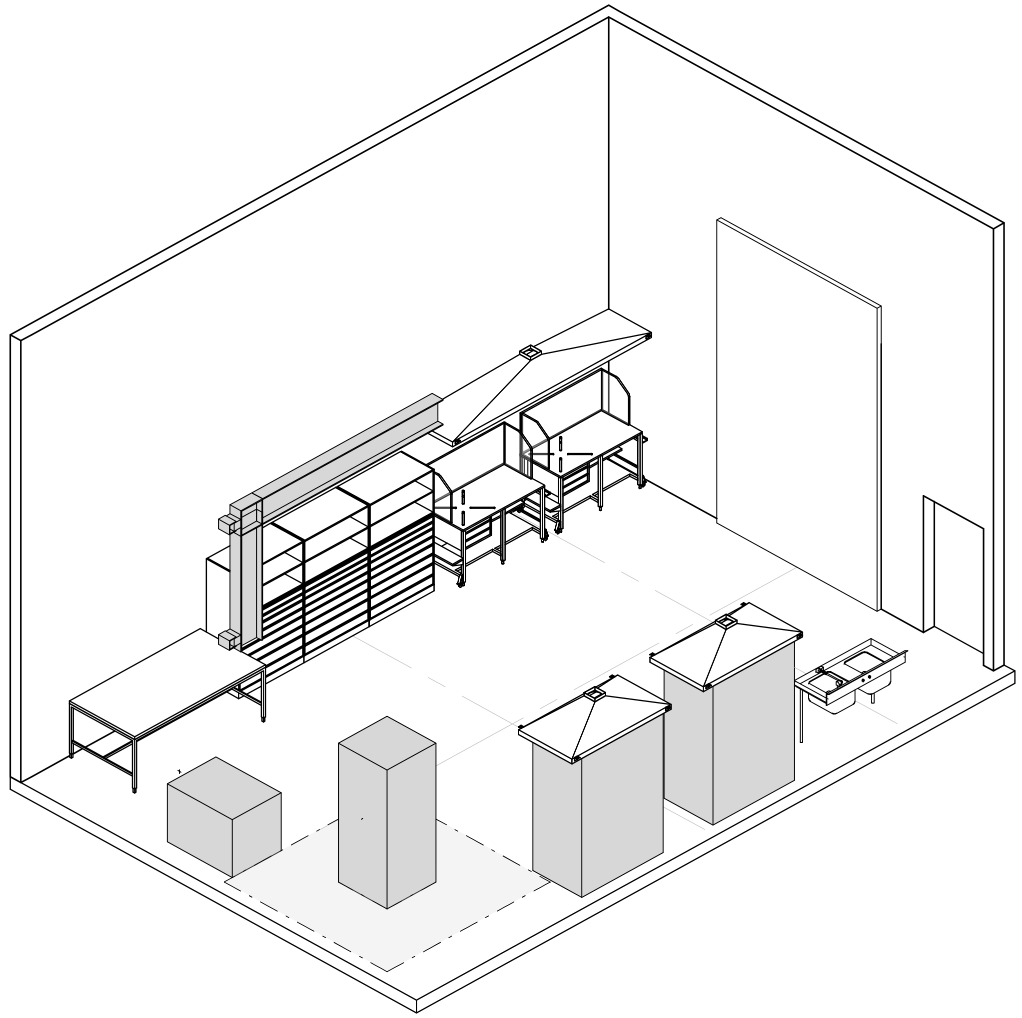
U2	CANOPY HOOD
U30	HOT & COLD WATER, LAB
U38	EYEWASH
U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E100	GRINDERS
E134	BELT SANDER - DELTA MODEL 52-6110
E172	MIG WELDER
E506	1t WALL MOUNTED JIB CRANE

REVISION # & ISSUE DATE: REV 8, 20/05/2021		SPACE ID #: 2.6		**RDS: 008-3**
DEPARTMENTS / GROUP NAME: TSTS (SMPL & TSB)	SPACE TYPE: WORKSHOP			**SPACE NAME: WELDING WORKSHOP**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: NRC & TSB HIGH BAY, MACHINE WORKSHOP — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LABORATORY	SPACE ID#: 3.1	**RDS-009-1**
CHIEF SCIENTIST: Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 103.68	**Space Name:**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 6AM-5PM	SPECIE USE: N/A	**PHOTO LAB**
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Room is utilized for photo/video documentation of wreckage and materials coming from the High Bay Labs. Requires photo/video studio, photovideo production area, storage area and a workstation area.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE: NOT REQUIRED
- OTHER / COMMENTS: EPOXY PAINTED FLOOR, MATTE FINISH (LIGHT COLORED)

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE: YES
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS: PARTITIONS IN SUITE COULD BE GYP. BD.
- MINIMUM STC 58 REQUIRED BETWEEN PHOTO LAB STUDIO AND HIGH BAY

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: (OTHER-DEFINE)
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:
- HEIGHT: 7m CLEAR TO U/S OF CEILING
- OTHER / COMMENTS: MOUNTEBLE CEILING GRID REQUIRED

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT: YES
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: F-FRAME
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: NO
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: EPOXY
- OTHER / COMMENTS: OPEN TALL STORAGE SHELVING (915mm x 610mm), CLOSED TALL STORAGE SHELVING (915mm x 610mm) , MOBILE WORKBENCH (915mm x 2440mm)
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS: NO
- OPERABLE: NO
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS: INTERIOR GLAZING PREFERRED FOR VISUAL TRANSPARENCY

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm X 2150 mm
- SECONDARY LEAF (IF APPLICABLE): 900 mm x 2150 mm
- VISION PANEL: N/A
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE: OVERHEAD DOOR
- PRIMARY LEAF: 1000 mm X 2150 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL: N/A
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS: VARIOUS LOCATIONS

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER / COMMENTS:

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC35
- OTHER / COMMENTS:
- - NOISE CONSIDERATION FOR VIDEO RECORDING

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE: N/A
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD: NO
- FAUCET TYPE: N/A
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):

HAZARD 1

HAZARD 2

HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING: Hanging loads for equipment (~ 5 kN)
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

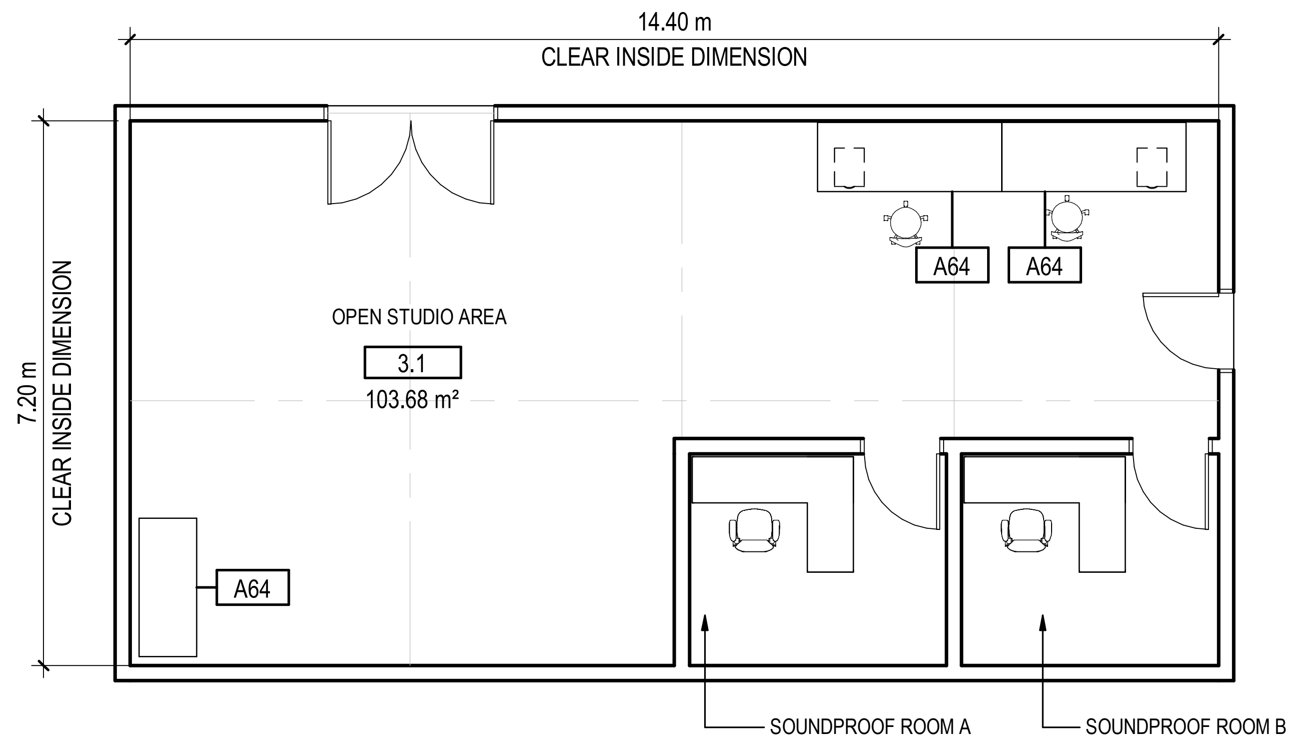
ELECTRICAL / POWER
- CLASS TYPE: EM + NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER:
- ISOLATED GROUNDING:
- GROUND FAULT PROTECTION:
- WEATHER PROOF:
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY:
- PLUG SPACING: 1m
- FLOOR BOX W TRENCH:
- OTHER / COMMENTS:
- CEILING MOUNT RECEPTACLES AROUND PERIMETER

LIGHTING
- SPECIALIZED LIGHTING: YES
- SPECIALIZED CONTROL: YES
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS:
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS:
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:
- UV AND DMX LIGHTING ON GRID SYSTEM

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.1	RDS: 009-2
DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LABORATORY		SPACE NAME: PHOTO LAB
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 6AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY TSB HIGH BAY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



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009-2
3.1 - PHOTO LAB
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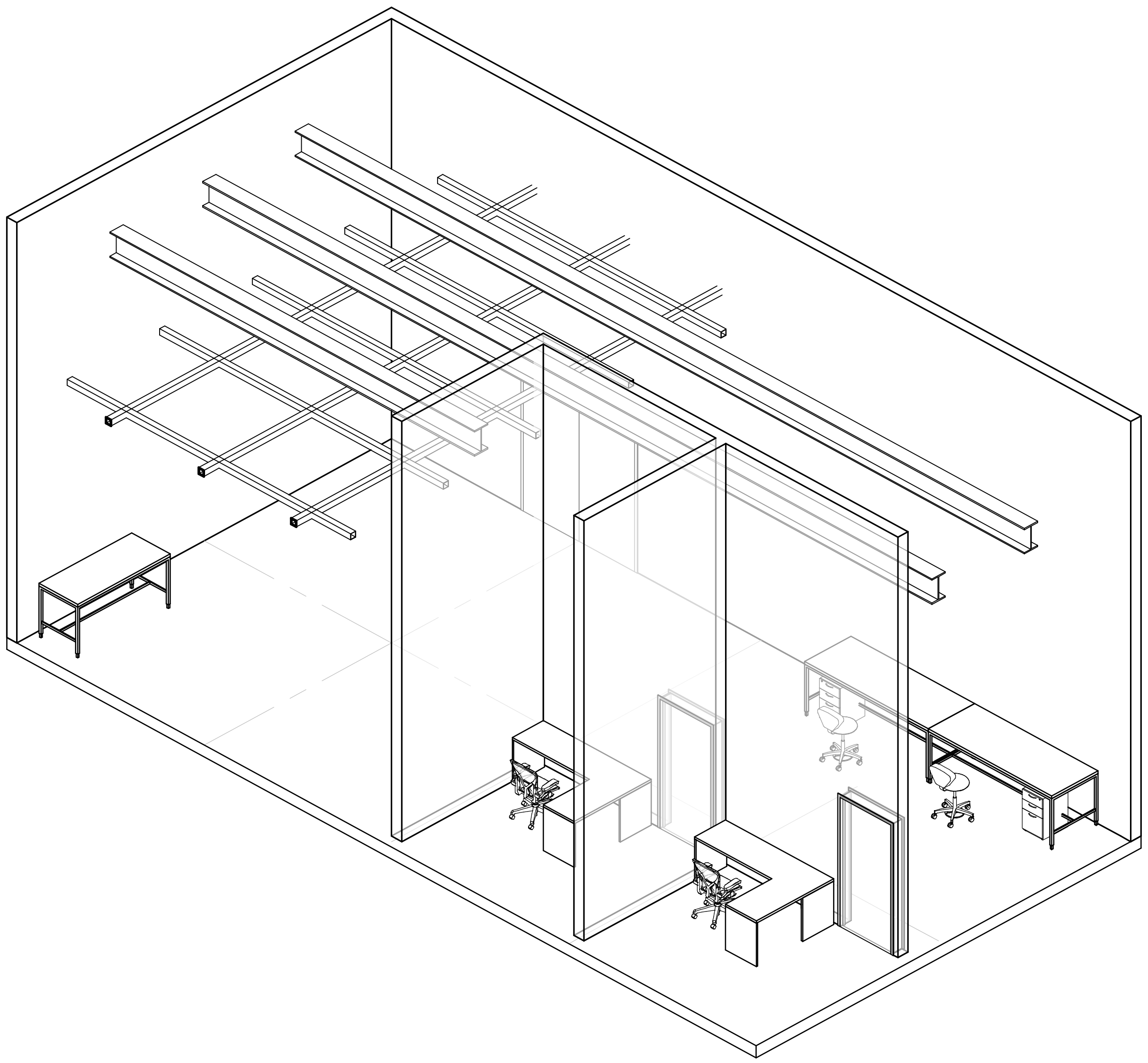
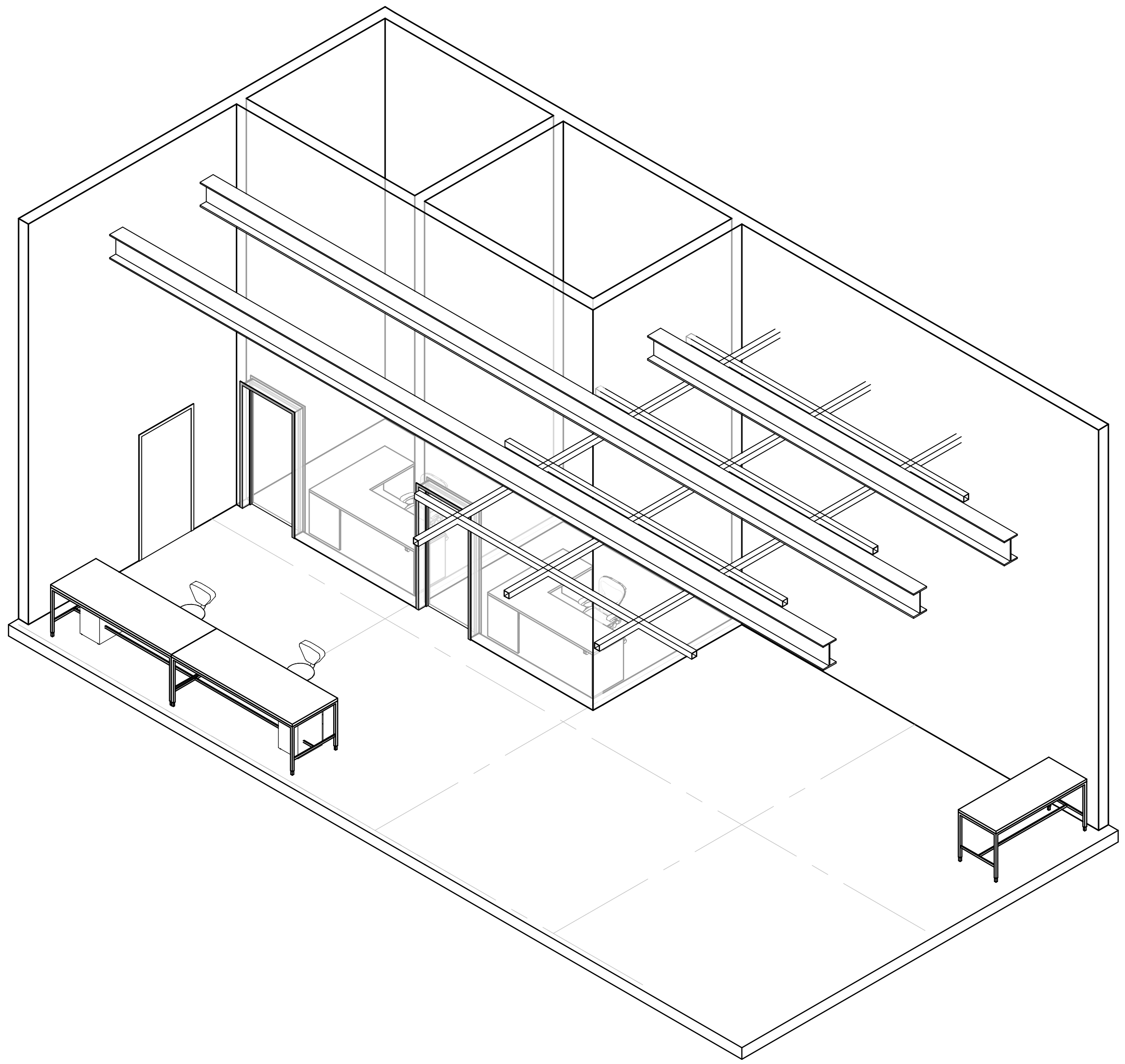
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A64	WORKBENCH, MOBILE		
A111	WORKSTATION "L"		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.1		**RDS: 009-3**
DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: PHOTO LAB**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 6AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY TSB HIGH BAY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY	SPACE ID#: 3.2	**RDS-010-1**
CHIEF SCIENTIST: Martin Breton and Rick Kearsy	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 18.00	**Space Name:**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: (OTHER-DEFINE)	OPERATING HOURS: 7AM-5PM	SPECIE USE: N/A	**CHEMICAL LAB**
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Chemical analyses and preparation. Wet lab/sink required. Also requires benching environment, exhaust/fume hood, and eyewash/shower.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE: YES
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS: CHEMICAL RESISTANCE REQUIRED

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS: CHEMICAL RESISTANCE REQUIRED

WALL TYPE / CONSTRUCTION
- WALL TYPE: 5/8" GYP.
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT: YES
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: CHEMICAL RESISTANT
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: MYLAR WRAPPED
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: SUSPENDED
- CASEWORK MATERIAL: STAINLESS STEEL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: CLOSED
- HEIGHT ADJUSTABLE: NO
- BASE CABINETS: HUNG
- COUNTERTOP MATERIAL: STAINLESS STEEL
- OTHER / COMMENTS: COUNTER & SINK, (610mm), CLOSED UPPER SHELVING, CLOSED LOWER CABINET
- CHEMICAL RESISTANCE REQUIRED
- CHEMICAL STORAGE: YES
- ACID: YES
- BASE: YES
- FLAMMABLE LIQUIDS: YES
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS: SEPARATED HAZARDOUS WASTE COLLECTION AREA WITH VENTILATED ACID, BASES AND FLAMMABLE LIQUIDS STORAGE CABINETS WITH SPILL PROTECTIVE COMPARTMENTS (FLAMMABLE) CHAMICAL STORED IN INTEGRATED BASE CABINET UNDER FUMEHOOD.

WINDOWS / DAYLIGHTING
- NATURAL LIGHT:
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: SINGLE + HALF
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 600 mm x 2150 mm
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS
- LAB CERTIFICATION REQUIREMENTS:
- TSB FUMEHOOD CURRENTLY TESTED TO ENSURE COMPLIANCE WITH MD15128-2008

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER / COMMENTS:

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: FUME HOOD EXHAUST
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: FUMEHOOD
- MECHANICAL NOISE (DECIBELS / NC): NC45
- OTHER / COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: YES - FUMEHOOD FACE VELOCITY
- EQUIPMENT MONITORING POINTS: YES (FUTURE EQUIPMENT)
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: (TSTS TO CONFIRM)
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: YES
- STEAM: NO
- COMP. AIR: YES
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES:

PLUMBING

FIXTURES
- SINK TYPES: SS SINGLE BASIN
- SINK DEPTH:
- SINK COUNTS: 1
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD: NO
- FAUCET TYPE: TOUCHLESS, GOOSENECK
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: YES
- CORROSIVE MATERIAL: (TSTS TO TBC)
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES

DRAINS / VENTS
- FLOOR DRAIN: SINGLE POINT
- TRAP DEPTH: 75mm OR 100mm
- MATERIAL: CARBON STEEL
- HEPA FILTERED PLUMBING VENTS: NO
- EFFLUENT DECONTAMINATION SYSTEM: NO
- EFFLUENT pH CONTROL: NO
- OTHER / COMMENTS:
- - CORROSION RESISTANT DRAIN AT FUME HOOD. ANTICIPATED CORROSI[V]
- CHEMICAL INCLUDE NITRIC, HYDROCHLORIC, AND SULFURIC ACIDS

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: DOUBLE INTERLOCK PRE-ACTION SYSTEM
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):

HAZARD 1
- CHEMICAL

HAZARD 2

HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

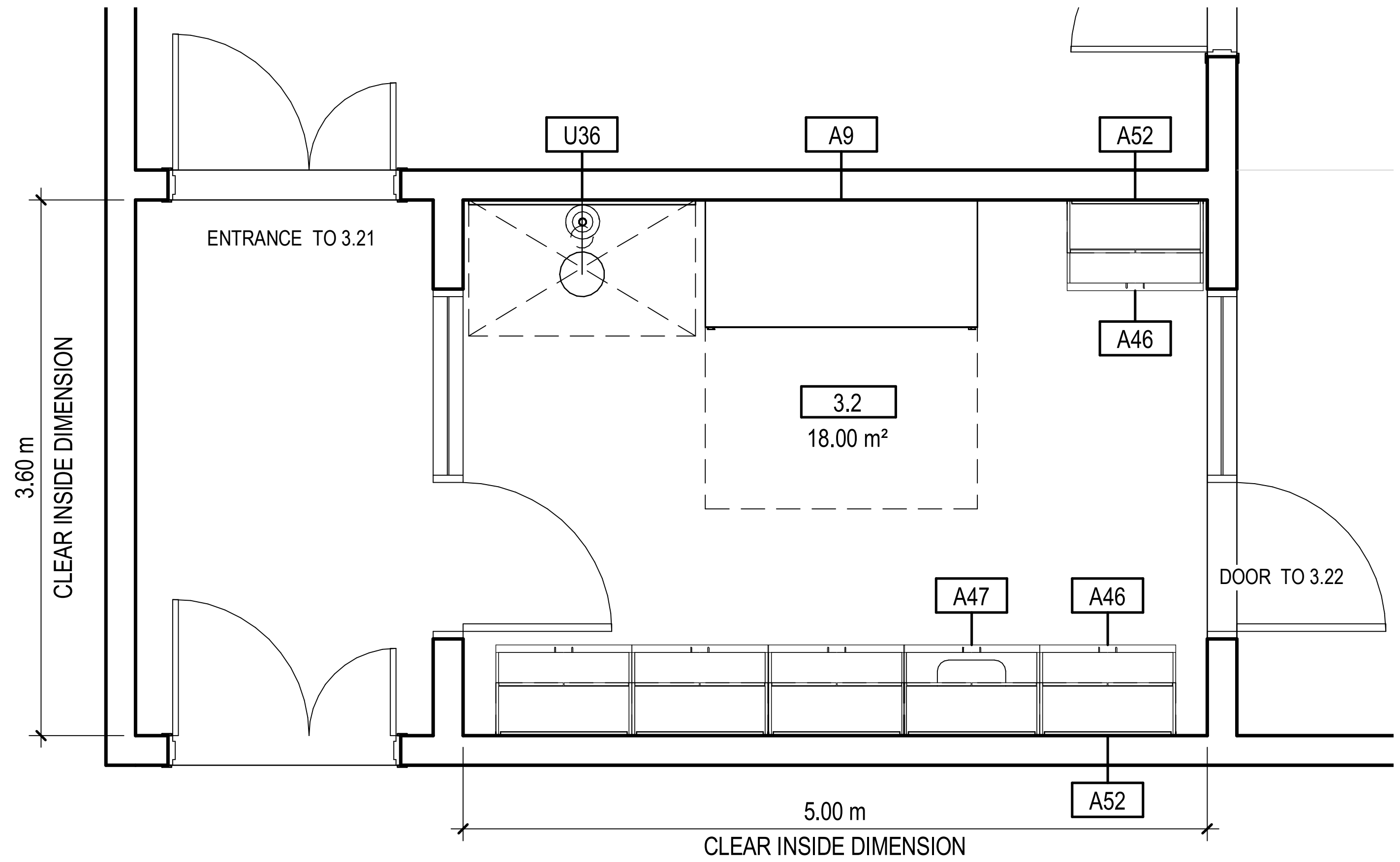
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION:
- WEATHER PROOF:
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY:
- PLUG SPACING: 1m
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- FUME HOOD CONNECTIONS

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS:
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:
- 2 DROPS ABOVE COUNTER

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.2	RDS: 010-2
DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY		SPACE NAME: CHEMICAL LAB
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: METALLOGRAPHIC SAMPLE PREPARATION — SECONDARY ADJACENCY: METALLOGRAPHIC SECTION AND SPECIMEN EXTRACTION — TERTIARY ADJACENCY		



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3.2 - CHEMICAL LAB

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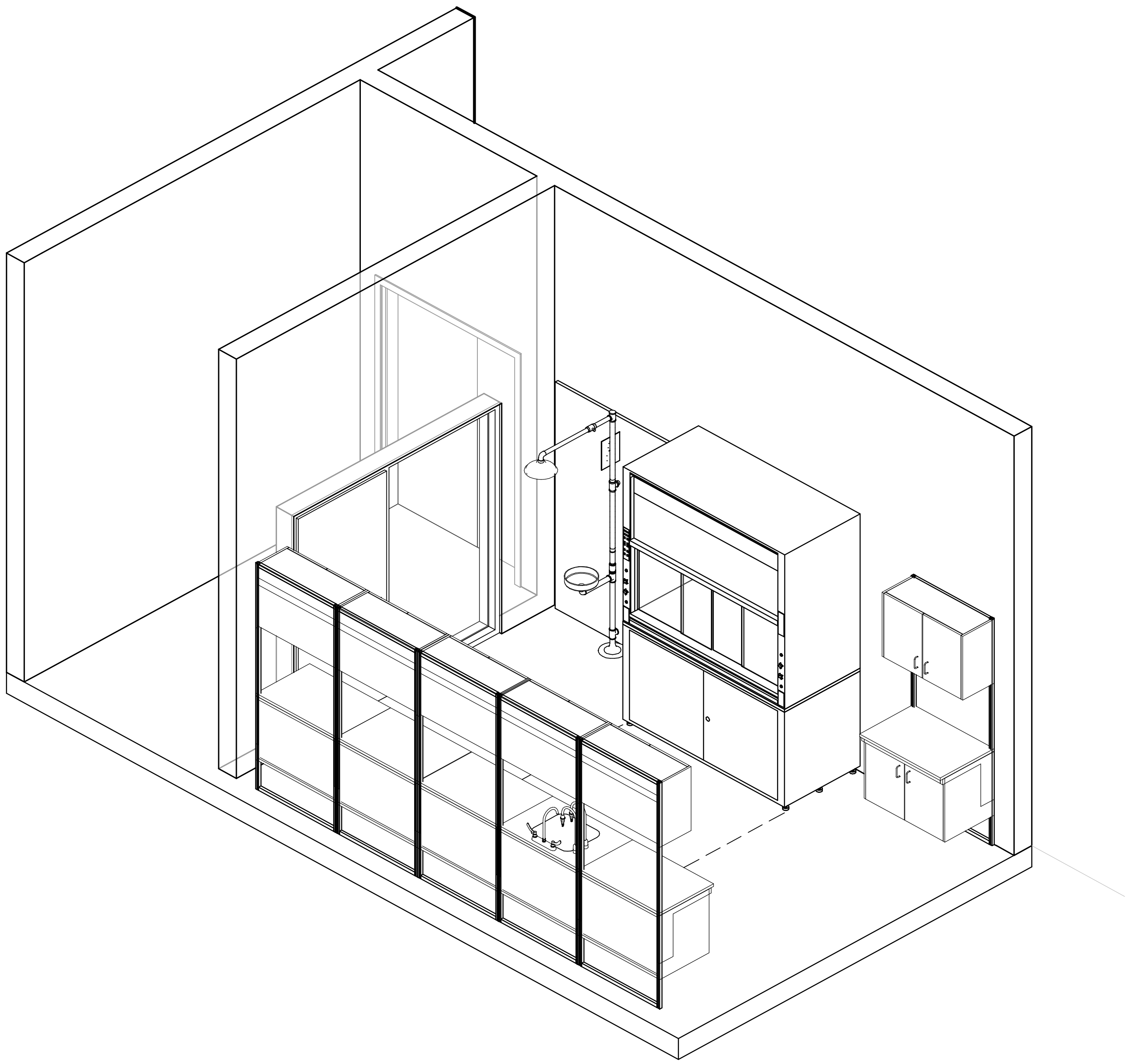
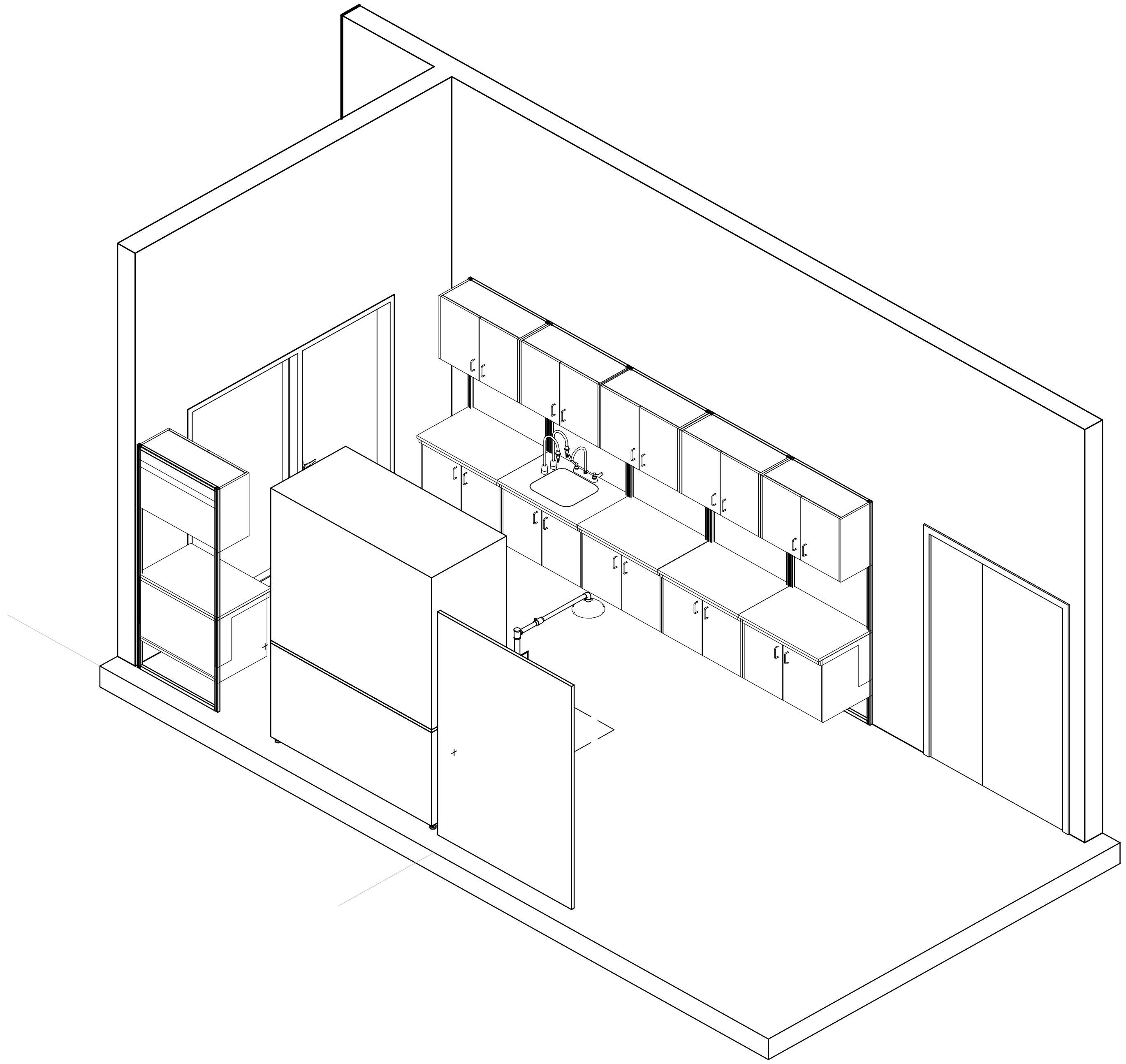
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A9	FUMEHOOD (GENERAL PURPOSE), 6'	U36	SAFETY EMERGENCY SHOWER AND EYEWASH
A46	CASEWORK, COUNTER		
A47	CASEWORK, COUNTER & SINK		
A48	CASEWORK, CLOSED LOWER CABINET		
A52	CASEWORK, CLOSED UPPER SHELVING		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.2		**RDS: 010-3**
DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY			**SPACE NAME: CHEMICAL LAB**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: METALLOGRAPHIC SAMPLE PREPARATION — SECONDARY ADJACENCY: METALLOGRAPHIC SECTION AND SPECIMEN EXTRACTION — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LABORATORY	SPACE ID#: 3.3	**RDS-011-1**
CHIEF SCIENTIST: Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 97.20	**Space Name:**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 7AM-5PM	SPECIE USE: N/A	**FLIGHT RECORDER + NVM**
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Combines the capabilities of the Flight Recorder Lab and the Non-Volatile Memory Lab into a single lab to optimize workflows and space. The lab requires: disassembly area, storage, examination area, rework/build area, download work area, chip recovery work area, office & meeting spaces		

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE: YES (MANDATORY)
- OTHER / COMMENTS: ANTI-STATIC FLOORING REQUIRED THROUGHOUT LAB

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: 5/8" GYP.
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS: BRIGHT WHITE WALLS IN LAB AND MIDDLE GREY IN COLLAB SPACES

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: CLOSED
- HEIGHT ADJUSTABLE:
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS: ALL WORK SURFACES AND CABINETS ANTISTATIC
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:
- ALL WORKBENCHES AND CHAIRS ARE REQUIRED TO BE ANTISTATIC

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS: YES
- OPERABLE: YES
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL: YES
- OTHER / COMMENTS: WINDOW TO HALLWAY FOR TOURS

DOORS/ HARDWARES
- DOOR TYPE: SINGLE
- PRIMARY LEAF: 1000 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL: PRIMARY LEAF
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- MULTIPLE DOORS AT VARIOUS LOCATIONS

- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm X 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm X 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE)
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

ADDITONAL USER COMMENTS
HOURS COULD BE EXTENDED DURING MAJOR INVESTIGATIONS

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER/COMMENTS:

CONTROLS
- CONTROLS TYPE: VARIABLE AIR VOLUME
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC45
- OTHER / COMMENTS:
- - SNORKEL EXHAUST FOR SOLDERING STATION, DISCHARGED TO EXTERIOR

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: YES
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:
- COMMENTS: - COMPRESSED AIR OUTLETS REQUIRED AT ESD WORKSTATIONS

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- **HAZARD 1**
- CHEMICAL
- **HAZARD 2**
- BIOLOGICAL - BLOOD, POSSIBLE TRACES OF HUMAN REMAINS
- **HAZARD 3**

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- 28VDC AND 400HZ AC AT WORK BENCHES

LIGHTING
- SPECIALIZED LIGHTING: YES
- SPECIALIZED CONTROL: YES
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: YES
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS:
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:
- OVERHEAD CONTROLABLE LIGHTING SUITABLE FOR PHOTOGRAPHY AT EXAM WORKBENCH

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LABORATORY	SPACE ID#: 3.3 A	RDS-011 A-1
CHIEF SCIENTIST: Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 17.58	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 7AM-5PM	SPECIE USE: N/A	DISASSEMBLY
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Combines the capabilities of the Flight Recorder Lab and the Non-Volatile Memory Lab into a single lab to optimize workflows and space. The lab requires: disassembly area, storage, examination area, rework/build area, download work area, chip recovery work area, office & meeting spaces		

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE: YES (MANDATORY)
- OTHER / COMMENTS: ANTI-STATIC FLOORING REQUIRED

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: 5/8" GYP.
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:
- BRIGHT WHITE WALLS IN LAB AND MIDDLE GREY IN COLLAB SPACES

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:
- WORKSPACES MUST BE IMPACT RESISTANT

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- ALL WORK SURFACES AND CABINETS ANTISTATIC
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS: YES
- OPERABLE: NO
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL: NO
- OTHER / COMMENTS:
- INTERIOR GLAZING PREFERRED FOR VIEWING INTO SPACE

DOORS/ HARDWARES
- DOOR TYPE: SINGLE
- PRIMARY LEAF: 1000 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL: PRIMARY LEAF
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER/COMMENTS:

CONTROLS
- CONTROLS TYPE: VARIABLE AIR VOLUME
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC45
- OTHER / COMMENTS:
- - SNORKEL EXHAUST AT WORK BENCH

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: YES (OUTLET PER WORKSTATION)
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: SS LARGE SINGLE BASIN W/ DRAIN TABLE AND HAND SPRAY
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE: MIXING, SWING SPOUT, DECK MOUNTED
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO
- - SINK C/W DRAIN BOARD

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- CHEMICAL
- HAZARD 2
- BIOLOGICAL - BLOOD, POSSIBLE TRACES OF HUMAN REMAINS
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

ELECTRICAL / POWER

- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: YES
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: YES
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LABORATORY	SPACE ID#: 3.3 B	RDS-011 B-1
CHIEF SCIENTIST: Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 17.58	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	STORAGE
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Combines the capabilities of the Flight Recorder Lab and the Non-Volatile Memory Lab into a single lab to optimize workflows and space. The lab requires: disassembly area, storage, examination area, rework/build area, download work area, chip recovery work area, office & meeting spaces		

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: 5/8" GYP.
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS: NO
- OPERABLE: NO
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL: NO
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: SINGLE
- PRIMARY LEAF: 1000 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL: PRIMARY LEAF
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER/COMMENTS:

CONTROLS
- CONTROLS TYPE: VARIABLE AIR VOLUME
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC45
- OTHER / COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 7.2 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION:
- PUBLIC PAGING:N/A
- INTERCOM:
- DATA TYPE / POINTS: N/A
- DATA PLUG SPACING:
- WIRELESS: NO
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LABORATORY	SPACE ID#: 3.3 C	RDS-011 C-1
CHIEF SCIENTIST: Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 93.60	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	CVR / FDR COLLABORATION ROOM
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Combines the capabilities of the Flight Recorder Lab and the Non-Volatile Memory Lab into a single lab to optimize workflows and space. The lab requires: disassembly area, storage, examination area, rework/build area, download work area, chip recovery work area, office & meeting spaces		

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: 5/8" GYP.
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:
- MIDDLE GREY FOR WALLS

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: REQUIRED
- WINDOWS: YES
- OPERABLE: YES
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL: YES
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: SINGLE
- PRIMARY LEAF: 1000 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL: PRIMARY LEAF
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS: MULTIPLE DOORS AT VARIOUS LOCATIONS
- ALL VISION GLASS/GLASS PANELS TO BE MINIMUM STC 50
- C/W PRIVACY BLINDS TO BLOCK GLASS PANEL

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m²):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER/COMMENTS:

CONTROLS
- CONTROLS TYPE: VARIABLE AIR VOLUME
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC30
- OTHER / COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: YES
- OTHER / COMMENTS:
- FLOOR BOXES C/W POWER/COMMS UNDER TABLE

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: YES
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: YES
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:
- SPECIAL COMPUTER CONNECTIONS REQUIRED

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LABORATORY	SPACE ID#: 3.3 D	**RDS-011 D-1**
CHIEF SCIENTIST: Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 97.20	**Space Name:**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	**AUDIO BOOTH**
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Combines the capabilities of the Flight Recorder Lab and the Non-Volatile Memory Lab into a single lab to optimize workflows and space. The lab requires: disassembly area, storage, examination area, rework/build area, download work area, chip recovery work area, office & meeting spaces		

ARCHITECTURAL

FLOOR FINISH
TYPE: SHEET VINYL
SLIP RESISTANCE:
ANTI-STATIC RESISTANCE:
OTHER / COMMENTS:

FLOOR BASE
TYPE: SHEET VINYL
INTEGRAL COVE: YES
OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
WALL TYPE: 5/8" GYP.
SHIELDING:
IMPACT RESISTANT:
WATER RESISTANT:
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE:
WALL FINISH: PAINT
OTHER / COMMENTS:
SOME ACOUSTIC ABSORPTION WILL BE REQUIRED TO PREVENT RESONANCE

PRIMARY CONTAINMENT DEVICE
PRIMARY CONTAINMENT DEVICE:
PRIMARY CONTAINMENT DEVICE:
OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
ACCESSIBILITY ELEMENT 1:
ACCESSIBILITY ELEMENT 2:
ACCESSIBILITY ELEMENT 3:
ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
SPACE REQUIRED FOR RECYCLING BIN (m^2):
SPACE REQUIRED FOR COMPOSTING BIN (m2):
UNOCCUPIED PERIOD TEMP. SET BACK:
TEMPERATURE SET BACK MAXIMUM (ºC):
TEMPERATURE SET BACK MINIMUM (ºC):
INDIVIDUAL TEMPERATURE CONTROL:
OTHER / COMMENTS:

CEILING
CEILING TYPE: TILE CEILING (HUNG)
HEIGHT: 4m
FINISH: ACOUSTIC TILE
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE:
OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
GASEOUS DECONTAMINATION:
SURFACE DECONTAMINATION:
FIRE EXTINGUISHER CABINET:
CRANE SUPPORT
ELECTROMAGNETIC SHIELDING:
PENETRATION SEALING:
OTHER / COMMENTS:

CASEWORK / MILLWORK
CASEWORK SYSTEM:
CASEWORK MATERIAL:
DEPTH:
UPPER CABINETS:
HEIGHT ADJUSTABLE:
BASE CABINETS:
COUNTERTOP MATERIAL:
OTHER / COMMENTS:
CHEMICAL STORAGE:
ACID:
BASE:
FLAMMABLE LIQUIDS:
STORAGE CABINET:
STORAGE DRAWER UNIT:
SHIELDED STORAGE UNIT:
OVERHEAD SERVICE CARRIER:
OTHER / COMMENTS:

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
NATURAL LIGHT: NOT REQUIRED
WINDOWS: NO
OPERABLE: NO
SAFETY GLAZING:
SAFETY ETCHING:
SHADE CONTROL:
OTHER / COMMENTS:

DOORS/ HARDWARES
DOOR TYPE: SINGLE
PRIMARY LEAF: 1000 mm x 2150 mm
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL: PRIMARY LEAF
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE: BOTH SIDES
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS: MULTIPLE DOORS AT VARIOUS LOCATIONS

DOOR TYPE: (OTHER-DEFINE)
PRIMARY LEAF: 1000 mm x 2150 mm
SECONDARY LEAF (IF APPLCABLE): 1000 mm x 2150 mm
VISION PANEL: BOTH LEAVES
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS: SLIDING DOOR AT MULTIPLE LOCATIONS

DOOR TYPE:
PRIMARY LEAF:
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
SETPOINTS (SUMMER): 25ºC
SETPOINTS (WINTER): 21ºC
+/- 1ºC
OTHER/COMMENTS:

CONTROLS
CONTROLS TYPE: VARIABLE AIR VOLUME
CONTROLS FRAMEWORK: BACNet OVER IP
OTHER / COMMENTS:
- UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
STATS: ZONE
SETPOINTS (SUMMER): 50% RH
SETPOINTS (WINTER): 30% RH
+/- 5% RH
TRIM HUMIDIFICATION: NO

VENTILATION
AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
ROOM FILTRATION - EXHAUST: NONE
ROOM FILTRATION - SUPPLY: NONE
AIR CIRCULATION METHOD: 100% SUPPLY
SPECIALITY EXHAUST: N/A
DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
DIRECTIONAL AIRFLOW METHOD: FORCED
PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
ROOM ISOLATION DAMPERS: NONE
FILTRATION TYPE: N/A
PRESSURE AIRFLOW INDICATOR: NONE
EQ. EXHAUST: N/A
MECHANICAL NOISE (DECIBELS / NC): NC30
OTHER / COMMENTS:

MONITORING AND ALARMS
PRESSURE / AIRFLOW INDICATOR: NO
EQUIPMENT MONITORING POINTS: NO
HVAC ALARM RELATIVE PRESSURIZATION: NO
ANIMAL ROOM MONITORING SYSTEM: NO
GAS DETECTION: NO
LIQUID / LEAK DETECTION: NO
TEMP / HUMIDITY: YES

PROCESS PIPING
PROCESS WATER: NO
STEAM: NO
COMP. AIR: NO
BREATHING AIR: NO
ANIMAL WATER: NO
PURIFIED WATER: NO
OTHER PROCESS FLUIDS:
OTHER PROCESS FLUIDS:

GASES
SUPPLY SYSTEM TYPE:
GAS TYPES: N/A

PLUMBING

FIXTURES
SINK TYPES: N/A
SINK DEPTH:
SINK COUNTS:
SINK DIMENSIONS:
INTEGRAL TO CASEWORK / BENCHTOP:
PEGBOARD:
FAUCET TYPE:
PIPING MATERIAL TYPE:
SIZE DIAMETER:
VENT SIZE DIAMETER:
SAFETY EMERGENCY SHOWER ANSI 358.1: NO
CORROSIVE MATERIAL: NO
SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
FLOOR DRAIN: N/A
TRAP DEPTH:
MATERIAL
HEPA FILTERED PLUMBING VENTS:
EFFLUENT DECONTAMINATION SYSTEM
EFFLUENT pH CONTROL
OTHER / COMMENTS:

FIRE PROTECTION / ALARM
HAZARD CLASS:
SPRINKLER SYSTEM: YES
SPRINKLER SYSTEM TYPE: WET PIPE
FIRE DETECTION: NORMAL (TO CODE)
ALARM METHOD: NORMAL
OTHER / COMMENTS:

HAZARDS
BUILDING HAZARD CLASS (NBC / NSF):
HAZARD 1
HAZARD 2
HAZARD 3

STRUCTURAL
STRUCTURAL DESIGN IMPLICATIONS:
ROLLING LOAD LIMITS:
VIBRATION CRITERA:
FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
STRUCTURAL SHIELD REQUIREMENT:
CEILING LOADING:
SPECIAL PENETRATIONS:
OTHER / COMMENTS:

ELECTRICAL / POWER

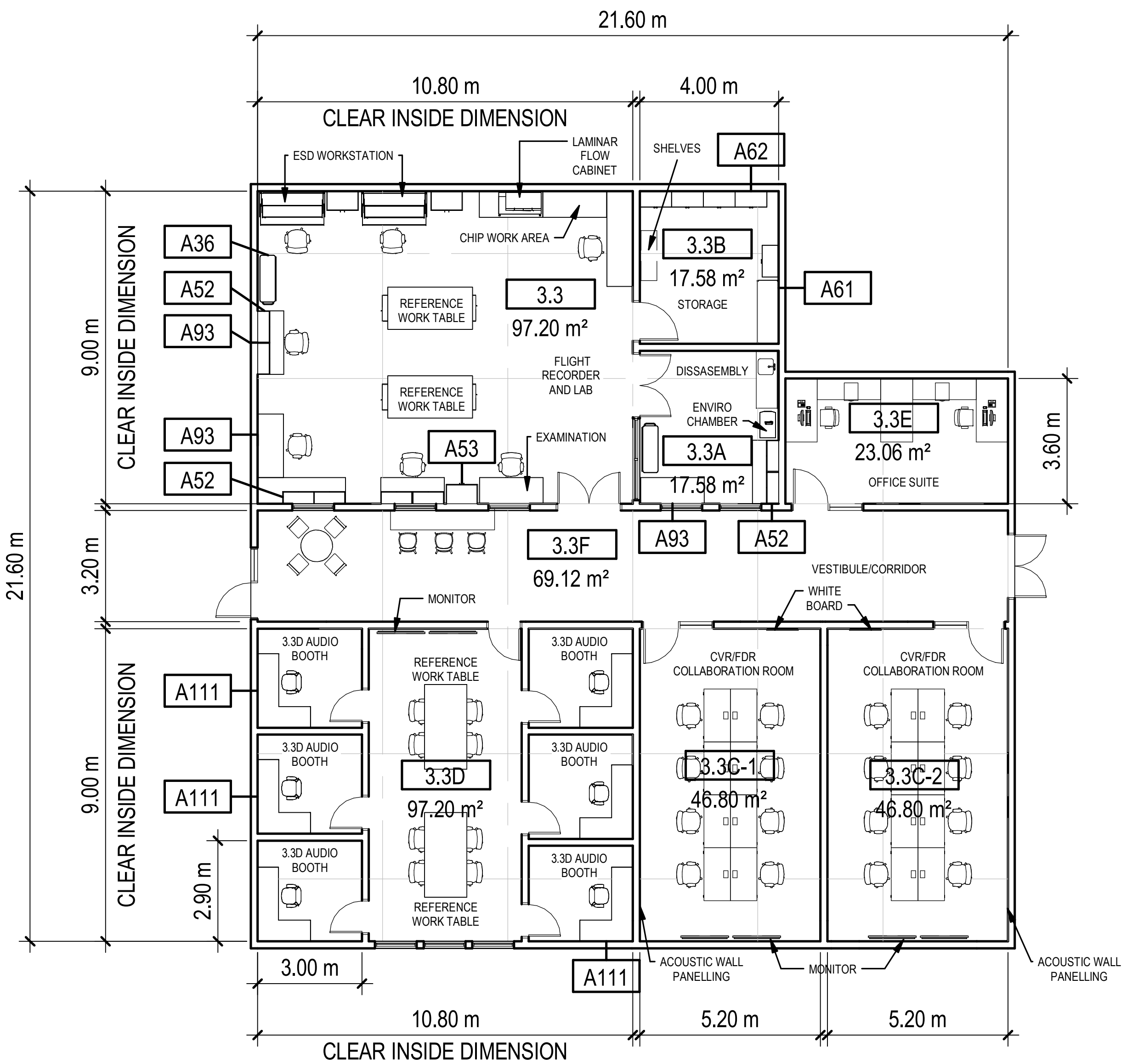
CLASS TYPE: NORMAL
VOLTAGE / CURRENT / PH 1: 208V / XXX / 3PH
VOLTAGE / CURRENT / PH 2:
SPECIAL NEMA PLUG ARRANGEMENT:
POWER DENSITY:
OVERHEAD SERVICE CARRIER: N/A
ISOLATED GROUNDING: N/A
GROUND FAULT PROTECTION: N/A
WEATHER PROOF COVER: N/A
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
TYPE IP RATING HERE:
RACEWAY: N/A
PLUG SPACING:
FLOOR BOX W TRENCH: NO
OTHER / COMMENTS:

LIGHTING
SPECIALIZED LIGHTING: NO
SPECIALIZED CONTROL: NO
MOUNT: RECESSED CEILING
FIXTURE OUTPUT: DIRECT
LIGHT LEVEL (LUX):
LIGHT COLOUR TEMP (KELVIN): 4000
DIMMING SYSTEM: YES
WHITE TUNING:
TASK LIGHTING: NO
SCENE/ZONE CONTROL: YES
OCCUPANCY SENSORS: YES
NIGHT LIGHT: NO
DAYLIGHT CONTROL: NO
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
SAFETY LIGHTS: NO
A/V EQUIPMENT INTERFACE: YES
OTHER / COMMENTS:

COMMUNICATIONS
PHONE: YES
CELLULAR COMMUNICATION:
PUBLIC PAGING: YES
INTERCOM:
DATA TYPE / POINTS: COPPER RJ45
DATA PLUG SPACING:
WIRELESS: YES
CABLE TRAY TYPE:
OTHER / COMMENTS:

SECURITY
CONNECTION TO CENTRAL MONITORING STATION:
CCTV:
EMERGENCY DISTRESS CALL:
FAIL-SAFE HARDWARE:
INTRUDER SYSTEM:
ACCESS CONTROL (OPTIONS BELOW)
-
-
-
-
SECURITY EQUIPMENT:
SECURITY ZONES:
OTHER / COMMENTS:
Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.3	**RDS: 011-2**
DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LABORATORY		**SPACE NAME: FLIGHT RECORDER + NVM**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: AVIONICS LAB — SECONDARY ADJACENCY: COLLABORATION ROOMS, AUDIO BOOTHS — TERTIARY ADJACENCY		



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011-2

3.3 - FLIGHT RECORDER + NVM

1 : 200

LEGEND

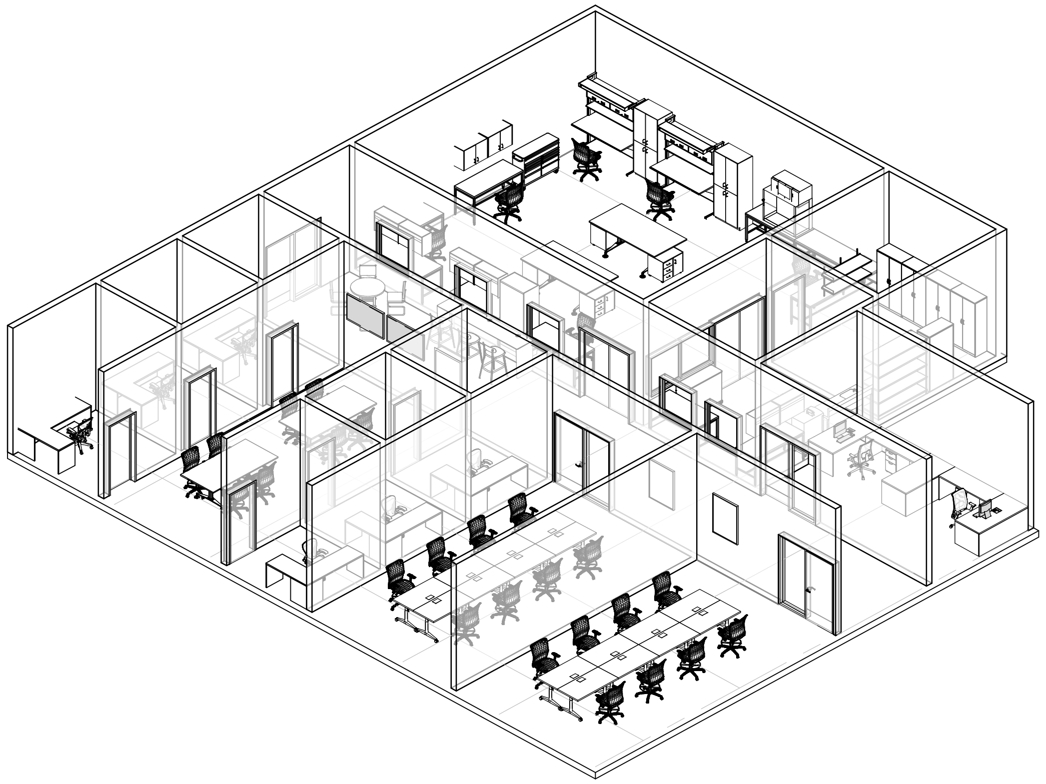
ARCHITECTURAL SYSTEMS

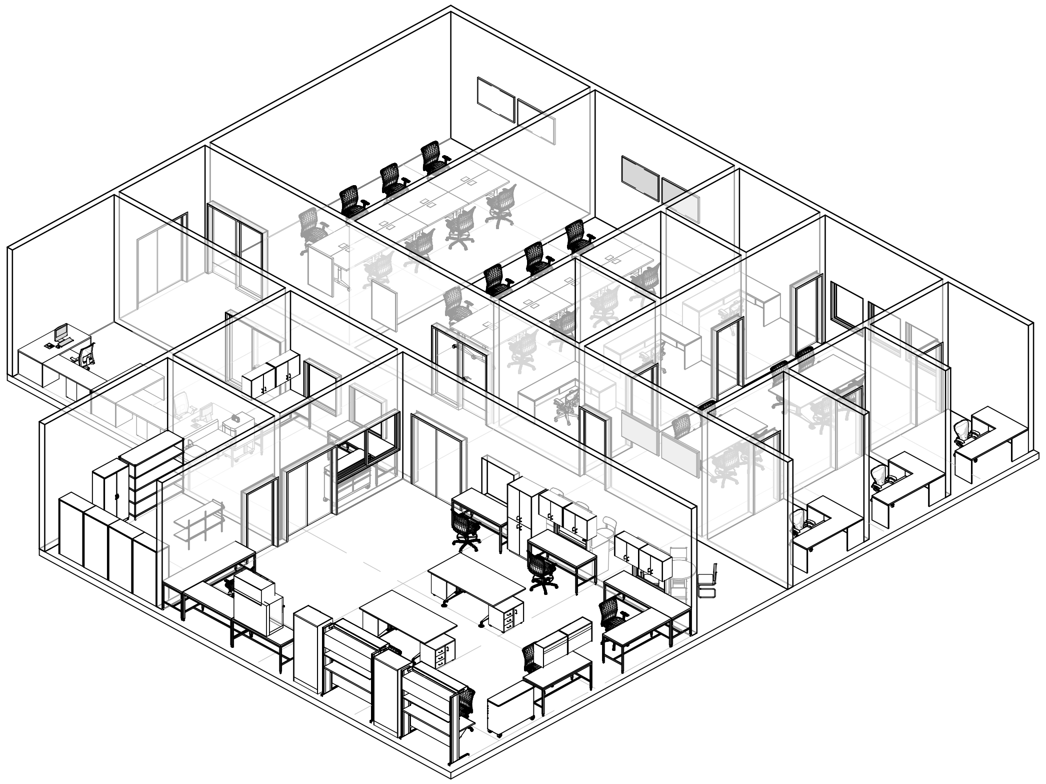
A36	MOBILE TOOL CABINET
A39	CASEWORK, MOBILE STORAGE CABINET
A52	CASEWORK, CLOSED UPPER SHELVING
A53	CASEWORK, TALL STORAGE CABINET
A93	ELECTROSTATIC DISHARGE TABLE

UTILITIES / SYSTEMS

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.3	**RDS: 011-3**
DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LABORATORY		**SPACE NAME: FLIGHT RECORDER + NVM**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: AVIONICS LAB — SECONDARY ADJACENCY: COLLABORATION ROOMS, AUDIO BOOTHS — TERTIARY ADJACENCY		





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LABORATORY	SPACE ID#: 3.4	**RDS-012-1**
CHIEF SCIENTIST: Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 103.68	**Space Name:**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 7AM-5PM	SPECIE USE: N/A	**AVIONICS LAB**
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Inspect, disassembly, and testing of electronic systems. Includes wet/dry lab, Faraday cage (shielded enclosure) with work surface & open space for racks. Benching and work tables are required to layout electronic equipment/devices.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE: YES (MANDATORY)
- OTHER / COMMENTS: ANTISTATIC FLOORING REQUIRED

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: 5/8" GYP.
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: (IF APPLICABLE)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING: YES
- PENETRATION SEALING:
- OTHER / COMMENTS:
- FARADAY CAGE REQUIRED TO BLOCK ELECTROMAGNETIC FIELDS

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:
- WORKBENCHES AND CHAIRS ARE REQUIRED TO BE ANTISTATIC

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: REQUIRED
- WINDOWS: YES
- OPERABLE: YES
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL: YES
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE: SINGLE
- PRIMARY LEAF: 1100 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER/COMMENTS:

CONTROLS
- CONTROLS TYPE: VARIABLE AIR VOLUME
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: SNORKEL
- MECHANICAL NOISE (DECIBELS / NC): NC45
- COMMENTS:
- - BENCHTOP FUME EXTRATOR WITH FILTER

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: YES
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: SS LARGE SINGLE BASIN W/ DRAIN TABLE AND HAND SPRAY
- SINK DEPTH:
- SINK COUNTS: 1
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE: MIXING, GOOSENECK, DECK MOUNTED
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
- COMMENTS: - EYEWASH INTEGRATED WITH SINK

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH (mm):
- MATERIAL: CARBON STEEL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM:
- EFFLUENT pH CONTROL:
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- **HAZARD 1**
- CHEMICAL
- **HAZARD 2**
- RADIATION - VERY LOW AIRCRAFT INSTRUMENTATION
- **HAZARD 3**
- BIOLOGICAL - BLOOD, POSSIBLE TRACES OF HUMAN REMAINS

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

ELECTRICAL / POWER

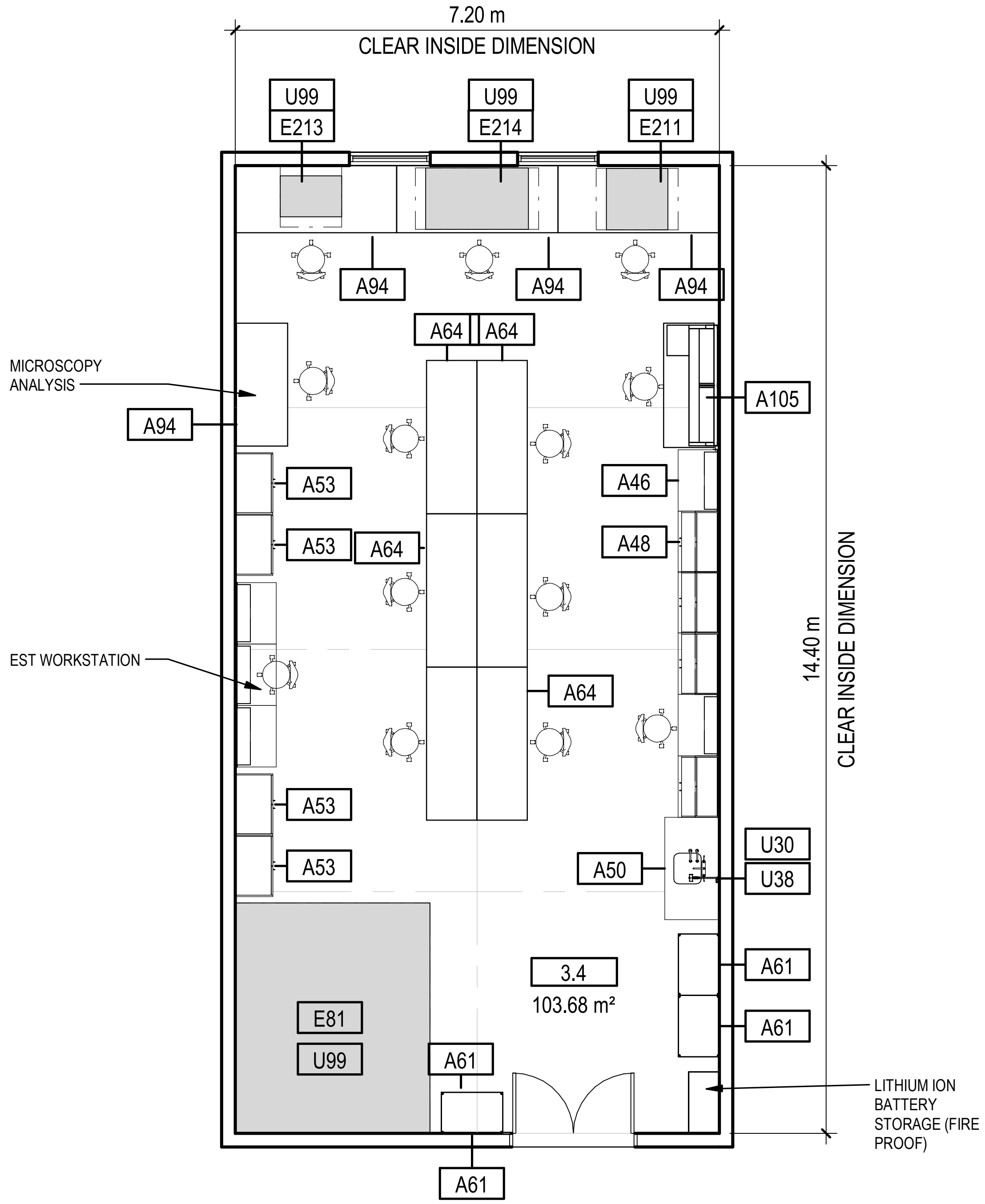
- CLASS TYPE: NORMAL + UPS
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: YES
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- REQUIRES 24VDC AND 400HZ AC ABOVE WORKBENCH

LIGHTING
- SPECIALIZED LIGHTING: YES
- SPECIALIZED CONTROL: YES
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: YES
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:
- PULL DOWN LIGHTING OVER CENTRAL WORKBENCHES

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.4	**RDS: 012-2**
DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LABORATORY		**SPACE NAME: AVIONICS LAB**
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: FLIGHT RECORDER + NVM — SECONDARY ADJACENCY: NON DESTRUCTIVE EVALUATION — TERTIARY ADJACENCY		



1 012-2 **3.4 - AVIONICS LAB**
1 : 100

LEGEND

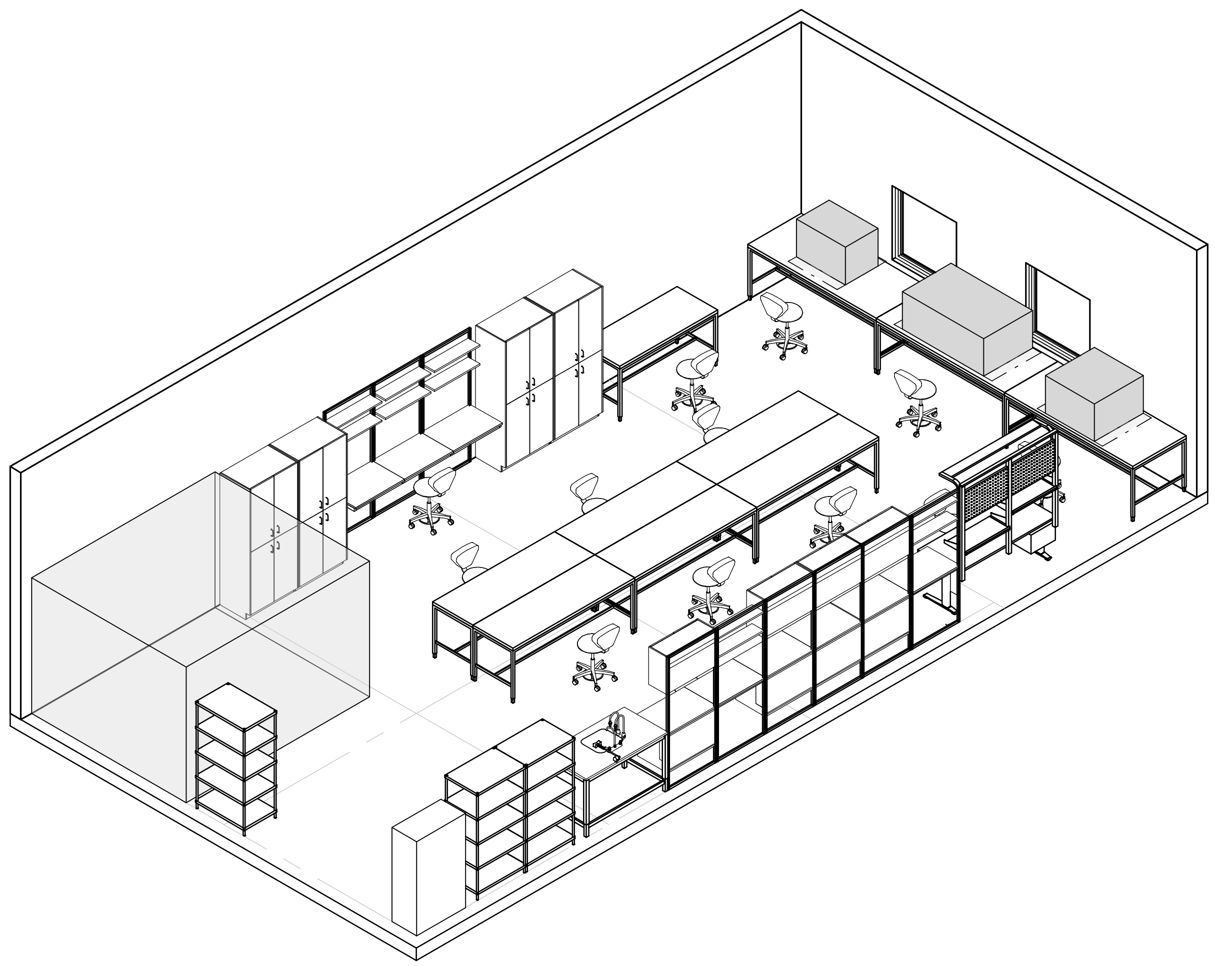
ARCHITECTURAL SYSTEMS / UTILITIES / SYSTEMS

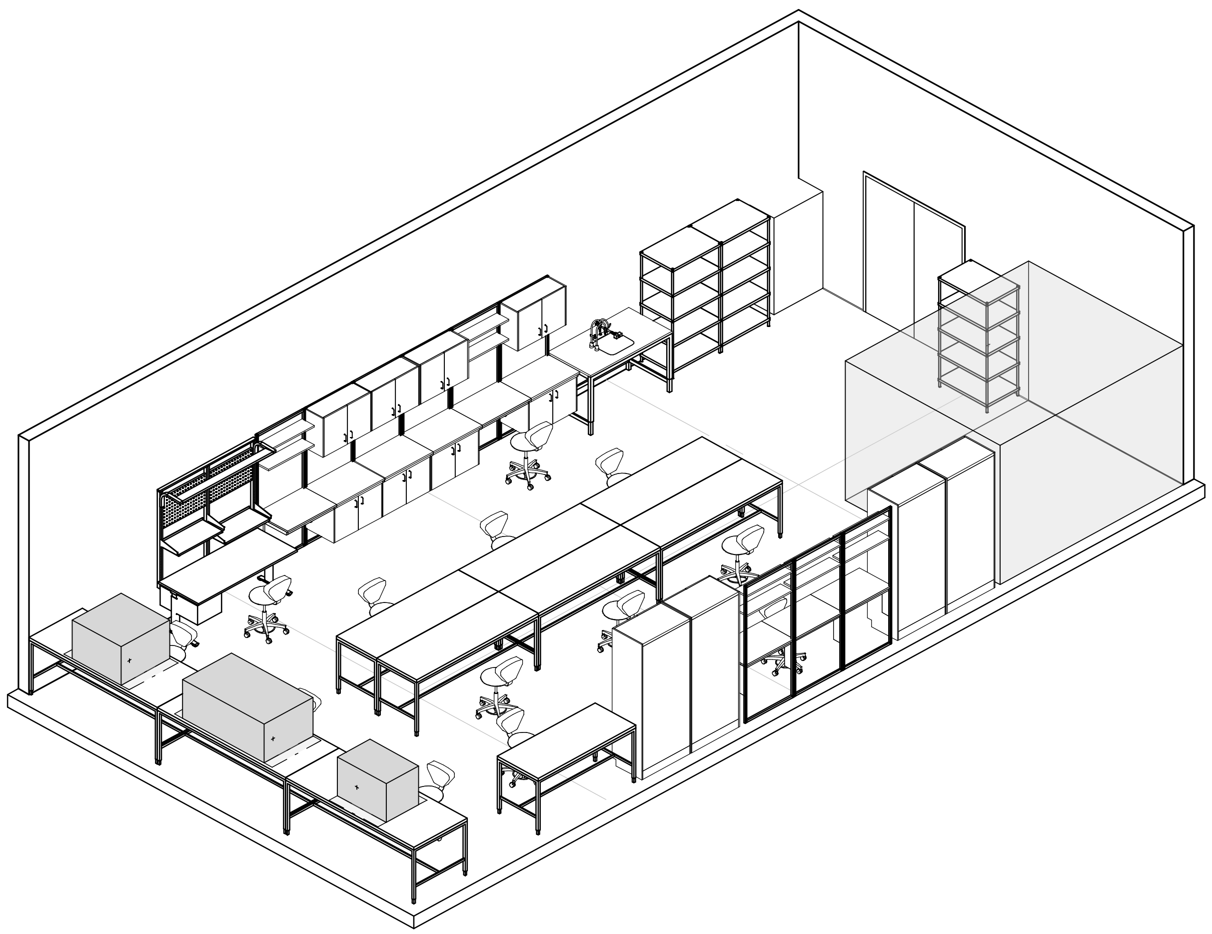
A46	CASEWORK, COUNTER	U30	HOT & COLD WATER, LAB
A48	CASEWORK, CLOSED LOWER CABINET	U38	EYEWASH
A50	CASEWORK, COUNTER & SINK END, ISLAND	U54	POWER, 120V., WIREWAY
A51	CASEWORK, OPEN UPPER SHELVING	U60	UNDERSHELF TASK LIGHT
A52	CASEWORK, CLOSED UPPER SHELVING	U62	DATA, WIREWAY
A53	CASEWORK, TALL STORAGE CABINET	U99	EQUIP CONNECTIONS PER EQUIP LIST
A61	STORAGE SHELVING, TALL, OPEN 36"		
A64	WORKBENCH, MOBILE		
A94	VIBRATION SUPRESSION TABLE		
A105	SOLDERING STATION		

SPECIALTY EQUIPMENT

E81	FARADAY CAGE
E211	HIROX DIGITAL MICROSCOPE
E213	MICROSCOPE - WILD LEITZ
E214	MICROSCOPE - WILD MODEL M7A

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.4		**RDS: 012-3**
DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: AVIONICS LAB**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: FLIGHT RECORDER + NVM — SECONDARY ADJACENCY: NON DESTRUCTIVE EVALUATION — TERTIARY ADJACENCY			

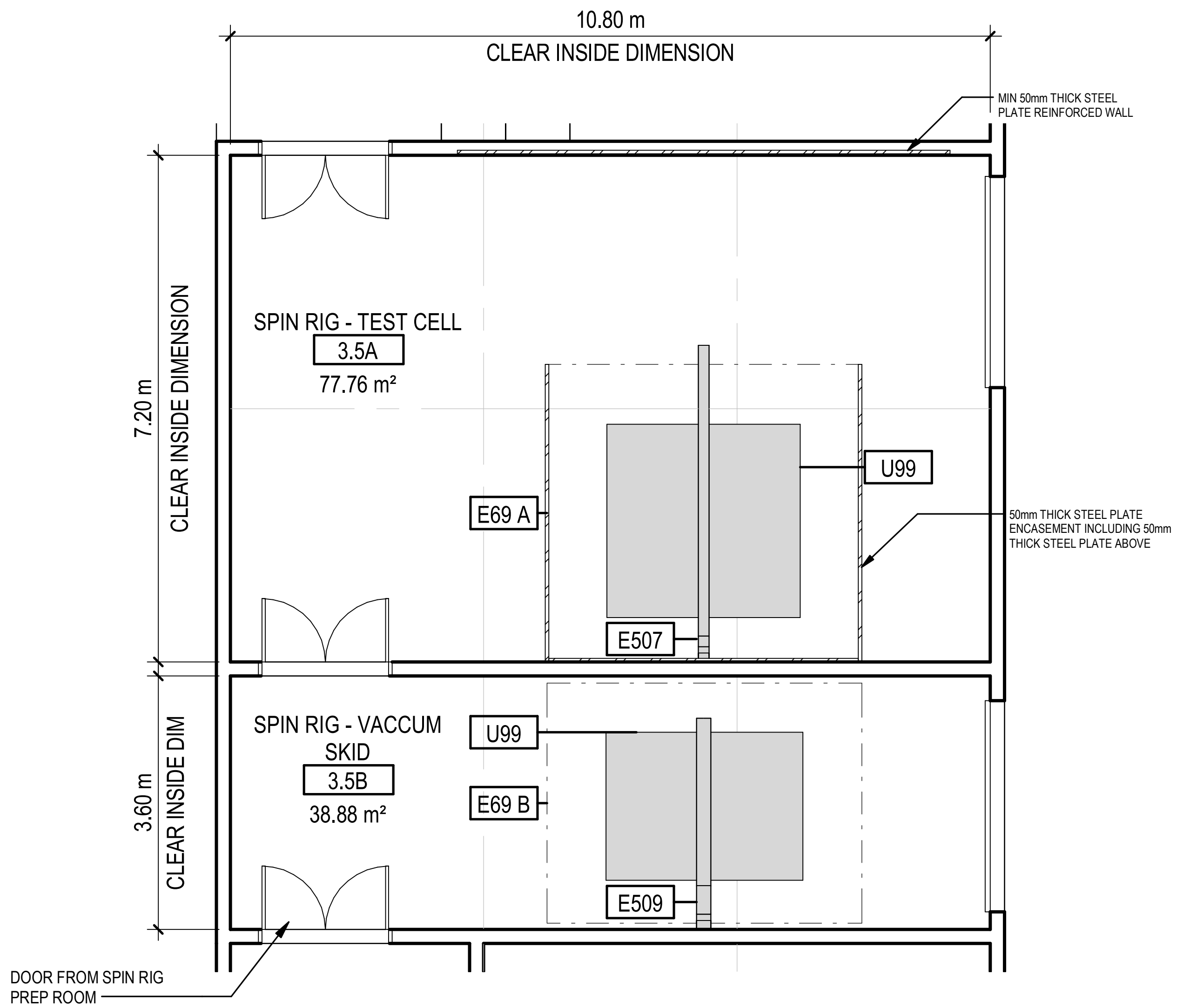




REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	SPACE ID#: 3.5	RDS-013-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 77.76 + 38.88 = 116.64	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	SPIN RIG
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Open space to locate test device cell Spin Rig with high energy rotor burst containment features. The Spin Rig is to be installed inside a concrete test cell to provide secondary burst containment safety features. High heat load, vacuum, large machinery, overhead crane, and sound proofing required.		

ARCHITECTURAL			MECHANICAL	PLUMBING	ELECTRICAL / POWER
FLOOR FINISH	CEILING	WINDOWS / DAYLIGHTING	TEMPERATURE	FIXTURES	CLASS TYPE: NORMAL
TYPE: CONCRETE (SMOOTH AND SEALED FINISH)	CEILING TYPE: OPEN CEILING	NATURAL LIGHT: NOT REQUIRED	SETPOINTS (SUMMER): (TSTS TO CONFIRM)	SINK TYPES: N/A	VOLTAGE / CURRENT / PH 1: 600V / XXX / 3 PH
SLIP RESISTANCE:	HEIGHT: TO STRUCTURE	WINDOWS: NO	SETPOINTS (WINTER): 18ºC	SINK DEPTH:	VOLTAGE / CURRENT / PH 2: 480V / XXX / 3PH 208V / XXX / 3 PH
ANTI-STATIC RESISTANCE:	FINISH: (IF APPLICABLE)	OPERABLE:	+/- (ºC)	SINK COUNTS:	SPECIAL NEMA PLUG ARRANGEMENT:
OTHER / COMMENTS:	ACOUSTIC PERFORMANCE: STC 50	SAFETY GLAZING:	OTHER/COMMENTS: - TSTS TO PROVIDE TEST DEVICE ROOM/ENVIRONMENT	SINK DIMENSIONS:	POWER DENSITY:
	PRESSURE PERFORMANCE:	SAFETY ETCHING:	DESIGN REQUIREMENTS	INTEGRAL TO CASEWORK / BENCHTOP:	OVERHEAD SERVICE CARRIER: N/A
	OTHER / COMMENTS: 7 m HIGH CEILING TO U/S STRUCTURE	SHADE CONTROL:	CONTROLS	PEGBOARD:	ISOLATED GROUNDING: N/A
		OTHER / COMMENTS:	CONTROLS TYPE:	FAUCET TYPE:	GROUND FAULT PROTECTION: N/A
			CONTROLS FRAMEWORK: BACNet OVER IP	PIPING MATERIAL TYPE:	WEATHER PROOF COVER: N/A
			OTHER / COMMENTS:	SIZE DIAMETER:	IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
FLOOR BASE	SPECIAL DESIGN CONSIDERATIONS			VENT SIZE DIAMETER:	TYPE IP RATING HERE:
TYPE:	GASEOUS DECONTAMINATION:			SAFETY EMERGENCY SHOWER ANSI 358.1: NO	RACEWAY: N/A
INTEGRAL COVE:	SURFACE DECONTAMINATION:		HUMIDITY	CORROSIVE MATERIAL: NO	PLUG SPACING: N/A
OTHER / COMMENTS:	FIRE EXTINGUISHER CABINET:	DOORS/ HARDWARES	STATS: ZONE	SAFETY EMERGENCY EYEWASH ANSI 358.1: NO	FLOOR BOX W TRENCH:
	CRANE SUPPORT: YES	DOOR TYPE: DOUBLE	SETPOINTS (SUMMER): UNCONTROLLED	OTHER: - NON POTABLE HOSE BIBB	OTHER / COMMENTS:
	ELECTROMAGNETIC SHIELDING:	PRIMARY LEAF: 900 mm x 2150 mm	SETPOINTS (SUMMER): UNCONTROLLED		SPIN RIG MACHINE CONNECTION TO CONTROL ROOM
	PENETRATION SEALING:	SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm	+/- % RH		TRENCH BETWEEN VACUUM SKID AND TEST CELL AREA
	OTHER / COMMENTS:	VISION PANEL:	TRIM HUMIDIFICATION: NO	DRAINS / VENTS	LIGHTING
		LOCKSET TYPE:		FLOOR DRAIN: SINGLE POINT	SPECIALIZED LIGHTING: YES
		ARMOUR PLATE:	VENTILATION	TRAP DEPTH: 75mm OR 100mm	SPECIALIZED CONTROL: NO
		KICK PLATE: BOTH SIDES	AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT	MATERIAL: CARBON STEEL	MOUNT: PENDANT CEILING
		ACCESS CONTROL:	PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT	HEPA FILTERED PLUMBING VENTS: NO	FIXTURE OUTPUT: DIRECT
WALL TYPE / CONSTRUCTION		DOOR INTERLOCK: (IF APPLICABLE)	ROOM FILTRATION - EXHAUST: NONE	EFFLUENT DECONTAMINATION SYSTEM: NO	LIGHT LEVEL (LUX):
WALL TYPE: CONCRETE	CASEWORK / MILLWORK	INDICATOR: (IF APPLICABLE)	ROOM FILTRATION - SUPPLY: NONE	EFFLUENT pH CONTROL: NO	LIGHT COLOUR TEMP (KELVIN): 4000
SHIELDING:	CASEWORK SYSTEM:	DOOR BUMPERS:	AIR CIRCULATION METHOD: 100% EXHAUST	OTHER / COMMENTS:	DIMMING SYSTEM: NO
IMPRACT RESISTANT: YES	CASEWORK MATERIAL:	DOOR JAMB GUARDS:	SPECIALITY EXHAUST: N/A	- DRAINAGE IN PIT AND AT VACUUM FRAME C/W OIL/GRIT INTERCEPTOR	WHITE TUNING:
WATER RESISTANT:	DEPTH:	OTHER / COMMENTS: MULTIPLE LOCATIONS	DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT		TASK LIGHTING: NO
ACOUSTIC PERFORMANCE: STC 50	UPPER CABINETS:		DIRECTIONAL AIRFLOW METHOD: FORCED		SCENE/ZONE CONTROL: NO
PRESSURE PERFORMANCE:	HEIGHT ADJUSTABLE:		PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT		OCCUPANCY SENSORS: NO
WALL FINISH: PAINT	BASE CABINETS:		ROOM ISOLATION DAMPERS: YES		NIGHT LIGHT: NO
OTHER / COMMENTS:	COUNTERTOP MATERIAL:		FILTRATION TYPE: N/A	FIRE PROTECTION / ALARM	DAYLIGHT CONTROL: NO
	OTHER / COMMENTS:		PRESSURE AIRFLOW INDICATOR: NONE	HAZARD CLASS:	IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
		DOOR TYPE: OVERHEAD DOOR	EQ. EXHAUST: E69 SPIN RIG SYSTEM	SPRINKLER SYSTEM: YES	SAFETY LIGHTS:
		PRIMARY LEAF: 4200 mm x 5000 mm	MECHANICAL NOISE (DECIBELS / NC): NC50	SPRINKLER SYSTEM TYPE: DOUBLE INTERLOCK PRE-ACTION SYSTEM	A/V EQUIPMENT INTERFACE:
		SECONDARY LEAF (IF APPLCABLE):	OTHER / COMMENTS:	FIRE DETECTION: NORMAL (TO CODE)	OTHER / COMMENTS:
		VISION PANEL:	- 3" VACUUM EXHAUST TO EXTERIOR FROM VACUUM FRAME	ALARM METHOD: NORMAL	
		LOCKSET TYPE:	- DEDICATED FORCED EA SYSTEM FOR ROOM C/W OUTDOOR AIR MAKE-UP	OTHER / COMMENTS:	
	CHEMICAL STORAGE:	ARMOUR PLATE:	OPENING	- PROVIDE COVERAGE IN ACCESSIBLE COMPONENTS OF PIT	
	ACID:	KICK PLATE	- 3" AIR DRYER TURBINE EXHAUST C/W INTEGRAL SILENCER TO TERMINATE		COMMUNICATIONS
PRIMARY CONTAINMENT DEVICE	BASE:	ACCESS CONTROL:	TO EXTERIOR COMPLETE WITH FILTER		PHONE: YES
PRIMARY CONTAINMENT DEVICE:	FLAMMABLE LIQUIDS:	DOOR INTERLOCK: (IF APPLICABLE)			CELLULAR COMMUNICATION:
PRIMARY CONTAINMENT DEVICE:	STORAGE CABINET:	INDICATOR: (IF APPLICABLE)	MONITORING AND ALARMS		PUBLIC PAGING:N/A
OTHER / COMMENTS:	STORAGE DRAWER UNIT:	DOOR BUMPERS:	PRESSURE / AIRFLOW INDICATOR: NO	HAZARDS	INTERCOM: NO
	SHIELDED STORAGE UNIT:	DOOR JAMB GUARDS:	EQUIPMENT MONITORING POINTS: NO	BUILDING HAZARD CLASS (NBC / NSF):	DATA TYPE / POINTS: COPPER RJ45
	OVERHEAD SERVICE CARRIER:	OTHER / COMMENTS:	HVAC ALARM RELATIVE PRESSURIZATION: NO	HAZARD 1	DATA PLUG SPACING:
			ANIMAL ROOM MONITORING SYSTEM: NO	OIL - ISO 32 ARGON or NITROGEN	WIRELESS: NO
	OTHER / COMMENTS:		GAS DETECTION: OXYGEN DEPLETION DUE TO DISPLACEMENT BY ARGON GAS		CABLE TRAY TYPE:
			LIQUID / LEAK DETECTION: YES (SENSOR LOCATED IN PIT)	HAZARD 2	OTHER / COMMENTS:
			TEMP: YES	OIL (ISO 32, ISO VG Class 68(ca), ISO VG Class 100(ca), Argon or Nitrogen	SPIN RIG MACHINE NETWORK CONNECTION
					CONDUIT FROM CONSOLE TO UNDER MACHINE PIT FOR CAMERA
ACCESSIBLITY REQUIREMENTS		DOOR TYPE:	PROCESS PIPING	HAZARD 3	
ACCESSIBILITY ELEMENT 1:		PRIMARY LEAF:	PROCESS WATER: YES		SECURITY
ACCESSIBILITY ELEMENT 2:		SECONDARY LEAF (IF APPLCABLE):	STEAM: NO		CONNECTION TO CENTRAL MONITORING STATION:
ACCESSIBILITY ELEMENT 3:		VISION PANEL:	COMP. AIR: YES		CCTV: SAFETY TYPE
ACCESSIBILITY ELEMENT 4:	ADDITONAL USER COMMENTS	LOCKSET TYPE:	BREATHING AIR: NO	STRUCTURAL	EMERGENCY DISTRESS CALL: YES
	LABORATORY EQUIPMENT CAN RUN 24/7	ARMOUR PLATE:	ANIMAL WATER: NO	STRUCTURAL DESIGN IMPLICATIONS:	FAIL-SAFE HARDWARE:
SUSTAINABILITY REQUIREMENTS	ACCESS TO LAB EQUIPMENT OUTSIDE REGULAR HOURS NEEDED	KICK PLATE	PURIFIED WATER: (TBC)	ROLLING LOAD LIMITS:	INTRUDER SYSTEM:
SPACE REQUIRED FOR RECYCLING BIN (m^2):		ACCESS CONTROL:	PROCESS COOLING: YES	VIBRATION CRITERA:	ACCESS CONTROL (OPTIONS BELOW)
SPACE REQUIRED FOR COMPOSTING BIN (m2):		DOOR INTERLOCK: (IF APPLICABLE)	OTHER PROCESS FLUIDS:	FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa	-
UNOCCUPIED PERIOD TEMP. SET BACK:		INDICATOR: (IF APPLICABLE)	COMMNETS:	FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa	-
TEMPERATURE SET BACK MAXIMUM (ºC):		DOOR BUMPERS:	- 3" COMP. AIR: 1200 ACFM @ 100 PSIG FROM ADJACENT EQUIP. RM TO VACUUM FRA	STRUCTURAL SHIELD REQUIREMENT:	-
TEMPERATURE SET BACK MINIMUM (ºC):		DOOR JAMB GUARDS:	- 1/2" COMP. AIR: 25 SCFM @ 60 PSIG UTILITY AIR SERVICE CONNECTION TO RIG	CEILING LOADING:	-
INDIVIDUAL TEMPERATURE CONTROL:		OTHER / COMMENTS:	- 1/2" WATER @ 1 GPM , < 80 DEG F. WATER QUALITY TO BE CONSIDERED	SPECIAL PENETRATIONS:	SECURITY EQUIPMENT:
OTHER / COMMENTS:			- CONDENSATE DRAINAGE SERVICE FROM VACUUM FRAME C/W OIL/WATER SEP.	OTHER / COMMENTS: 50 mm thick steel plate encasement for spin rig test	SECURITY ZONES:
			- UTILITIES BETWEEN RIG CELL AND VACUUM SKID THROUGH RECESSED UTILITY TRENCH	apparatus (3.5A).	OTHER / COMMENTS:
			GASES	0.5 t wall mounted jib crane inside encased test cell (3.5A)	DURESS BUTTON
			SUPPLY SYSTEM TYPE: GAS CYLINDER SYSTEM	1.5 t wall mounted jib crane for vacuum skid (3.5B)	REMOTE MONITORING CAMERA TO CONTROL ROOM
			GAS TYPES: UHP ARGON	Recess in slab-on-grade and four footings for 25,000 kg test rig (3.5A)	Refer to Appendix N - Protected B "RDS Security Input" document issued
					by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.5	**RDS: 013-2**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY		**SPACE NAME: SPIN RIG**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: CONTROL ROOM SPIN RIG, SPIN RIG EQ.SUPPORT — SECONDARY ADJACENCY: SPIN AND BURNER RIG EQUIP SUPPORT — TERTIARY ADJACENCY		



1 / 013-2 **3.5 - SPIN RIG**
1 : 100

LEGEND

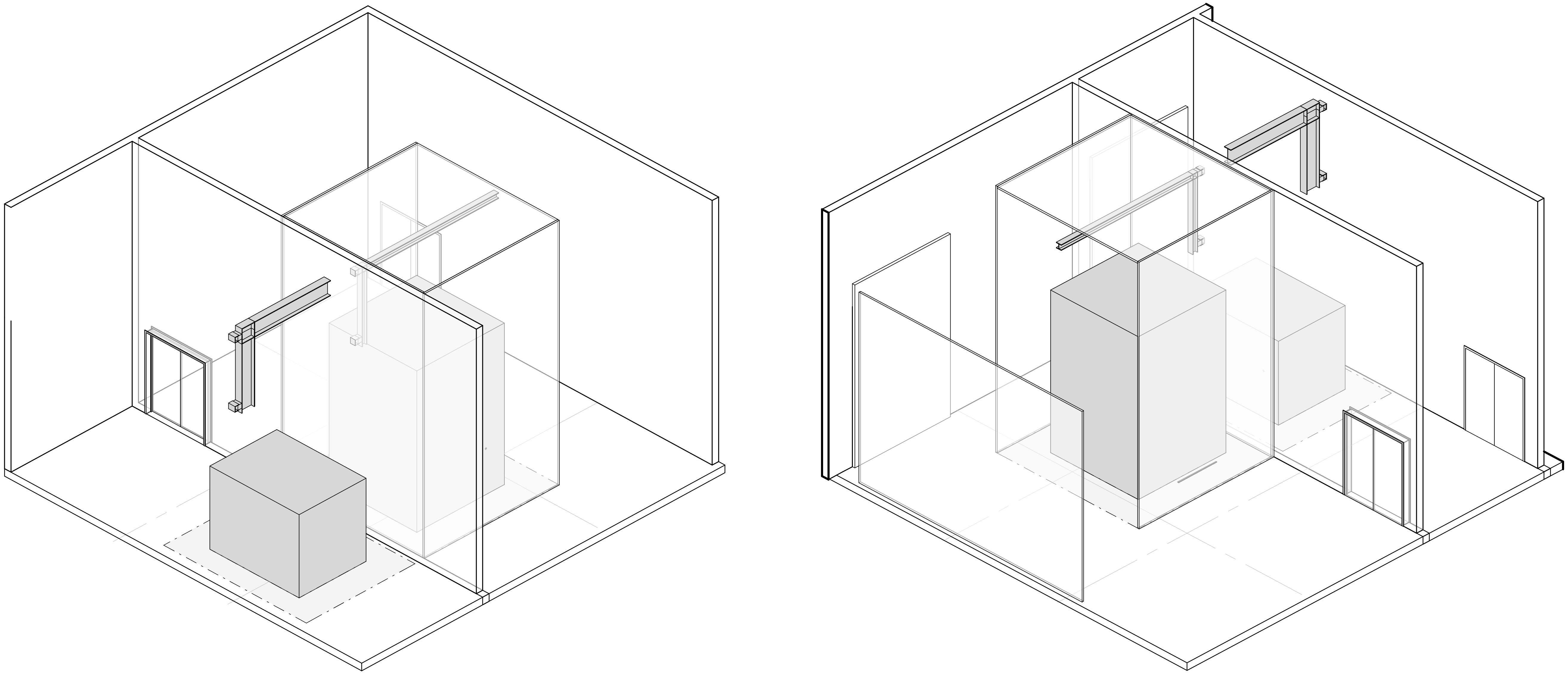
ARCHITECTURAL SYSTEMS / UTILITIES / SYSTEMS

		U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E69 A	SPIN RIG TEST SYSTEM		
E69 B	VACCUM FOR SPIN RIG		
E509	1.5t WALL MOUNTED JIB CRANE		

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.5		**RDS: 013-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY			**SPACE NAME: SPIN RIG**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: CONTROL ROOM SPIN RIG, SPIN RIG EQ.SUPPORT — SECONDARY ADJACENCY: SPIN AND BURNER RIG EQUIP SUPPORT — TERTIARY ADJACENCY			



REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	SPACE ID#: 3.6	RDS-014-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: N/A		AREA (m2): 25.92	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE:	CONTROL ROOM SPIN RIG
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Control Room for Spin Rig. The room required an area for a workstation and open space for electrical equipment and Spin Rig control devices.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: CONCRETE
- SHIELDING:
- IMPRACT RESISTANT: YES
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m²):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: 4m
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE:
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS
- LABORATORY EQUIPMENT CAN RUN 24/7
- ACCESS TO LAB EQUIPMENT OUTSIDE REGULAR HOURS NEEDED

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: SINGLE
- PRIMARY LEAF: 1000 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER/COMMENTS:

CONTROLS
- CONTROLS TYPE: VARIABLE AIR VOLUME
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK C/W LOCAL OCCUPANCY OVERRIDE

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC45

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: Locally reinforce for air compressors (~25 kN) as required

ELECTRICAL / POWER

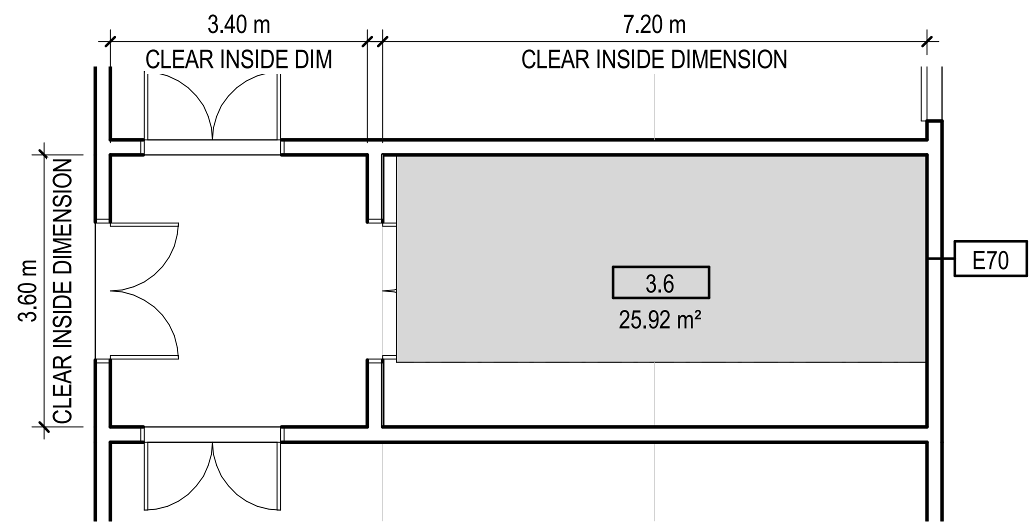
- CLASS TYPE: NORMAL + UPS
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- CONDUIT PATH TO VACUUM SKID FOR POWER/COMM CONNECTION

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT:
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS:
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:
- CONTROL SPIN RIG ROOM LIGHTING FROM HERE

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:
- VIDEO MONITORING TO SPIN RIG ROOM
- SPIN RIG MACHINE CONNECTIONS

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV: SAFETY TYPE
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- CARD
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.6		RDS: 014-2
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY			SPACE NAME: CONTROL ROOM SPIN RIG
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: SPIN RIG — SECONDARY ADJACENCY: SPIN RIG PREP ROOM — TERTIARY ADJACENCY			



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014-2

3.6 - CONTROL ROOM SPIN RIG

1 : 100

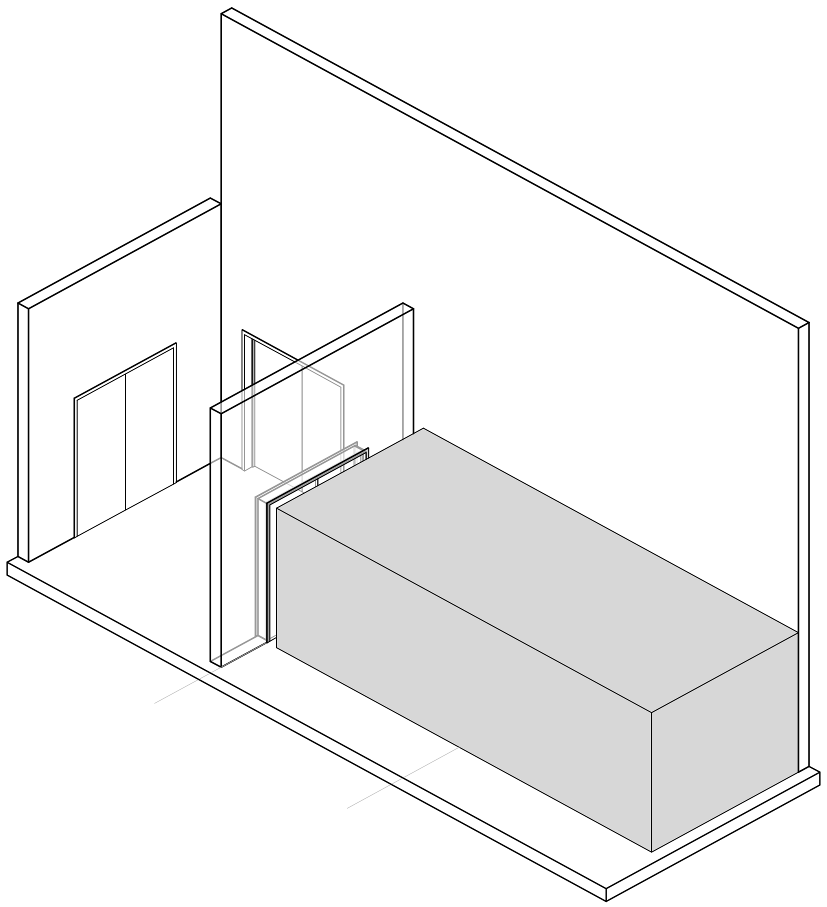
LEGEND

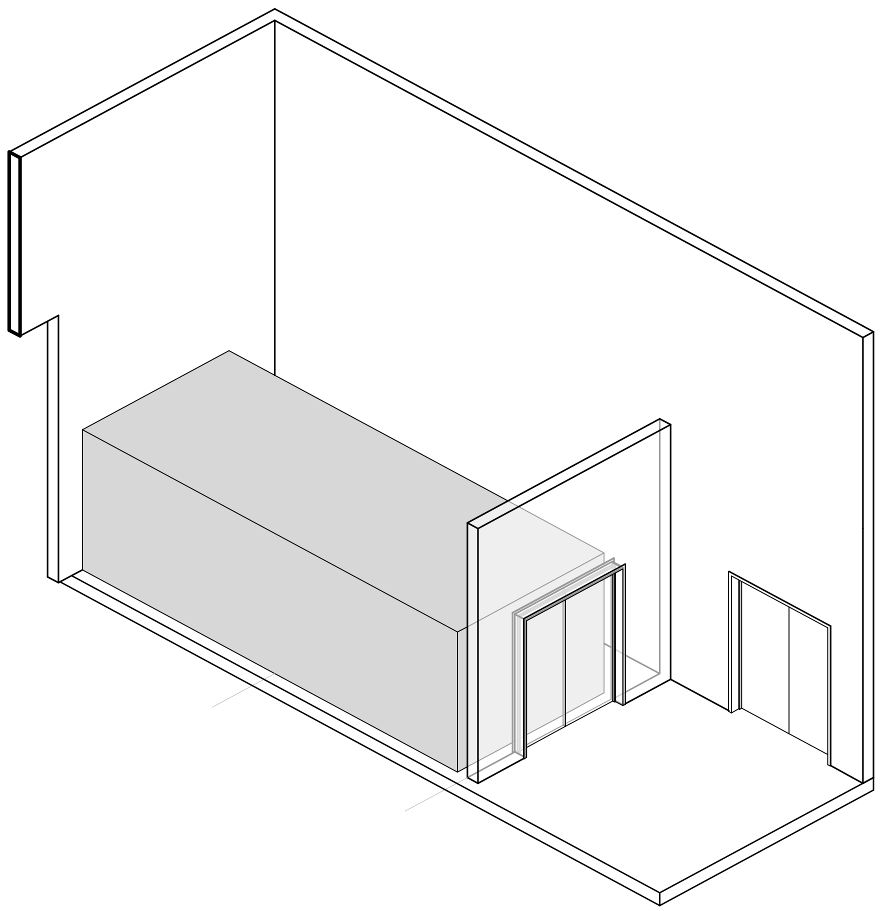
ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	

SPECIALTY EQUIPMENT

E70	SPIN RIG TEST CONTROL CONSOLE		

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.6	**RDS: 014-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY		**SPACE NAME: CONTROL ROOM SPIN RIG**
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: SPIN RIG — SECONDARY ADJACENCY: SPIN RIG PREP ROOM — TERTIARY ADJACENCY		





REVISION # & ISSUE DATE: REV 7, 20/05/2021	**DEPARTMENTS / GROUP NAME: NRC**	**SPACE TYPE: LABORATORY**	**SPACE ID#: 3.7**	**RDS-015-1**
CHIEF SCIENTIST: Rick Kearsey	**CONTAINMENT RISK LEVEL: CL2**		**AREA (m2): 38.88**	**Space Name:**
CMO REP: Ann Marie Sibbald	**LAB CERTIFICATION REQUIREMENTS:**	**OPERATING HOURS: 8AM-5PM**	**SPECIE USE: N/A**	**SPIN RIG PREP ROOM**
LC REP: Sophie Harvey	**ROOM FUNCTION AND ACTIVITES:**	**Assembly room for Spin Rig.**		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE (OTHER-DEFINE): _______________
- INTEGRAL COVE: YES
- OTHER / COMMENTS: CONCRETE CURB UPSTAND

WALL TYPE / CONSTRUCTION
- WALL TYPE: CONCRETE
- SHIELDING:
- IMPRACT RESISTANT: YES
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS: WALL ON CORRIDOR SIDE CAN BE GB OR CMU

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: 4m
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS: REQUIRES NON-VENTED FLAMMABLE STORAGE CABINET
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:
- NON VENTED FLAMMABLE STORAGE CABINET

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS
- LABORATORY EQUIPMENT CAN RUN 24/7
- ACCESS TO LAB EQUIPMENT OUTSIDE REGULAR HOURS NEEDED

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER/COMMENTS:

CONTROLS
- CONTROLS TYPE: VARIABLE AIR VOLUME
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK C/W LOCAL OCCUPANCY OVERRIDE

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: YES (UTILITY @ WORKBENCHES)
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: SS DOUBLE BASIN
- SINK DEPTH:
- SINK COUNTS: 1
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE: MIXING, GOOSENECK, DECK MOUNTED
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
- COMMENTS: EYEWASH INTEGRATED WITH SINK

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):

HAZARD 1
- IL (ISO 32, ISO VG Class 68(ca), ISO VG Class 100(ca), Argon or Nitrogen, Various solvents for cleaning parts

HAZARD 2

HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: 0.5 t wall monted jib crane

ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: YES
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- WIREMOLD ABOVE WORKBENCHES
- 20A-220V OUTLETS AT WORKBENCH

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:

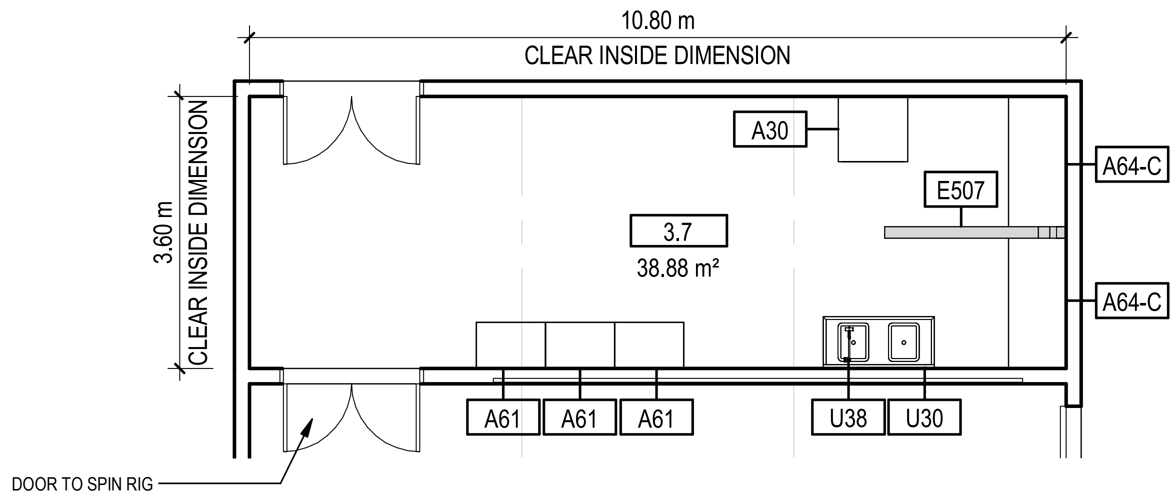
COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.7	RDS: 015-2
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY		SPACE NAME: SPIN RIG PREP ROOM
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	

REQUIRED ADJACENCIES:

ROOM — PRIMARY ADJACENCY: SPIN RIG — SECONDARY ADJACENCY: CONTROL ROOM SPIN RIG — TERTIARY ADJACENCY



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015-2

3.7 - SPIN RIG PREP ROOM

1 : 100

LEGEND

ARCHITECTURAL SYSTEMS

A30	FLAMMABLE STORAGE CABINET
A61	STORAGE SHELVING, TALL, OPEN 36"
A64-C	WORKBENCH, STATIONARY

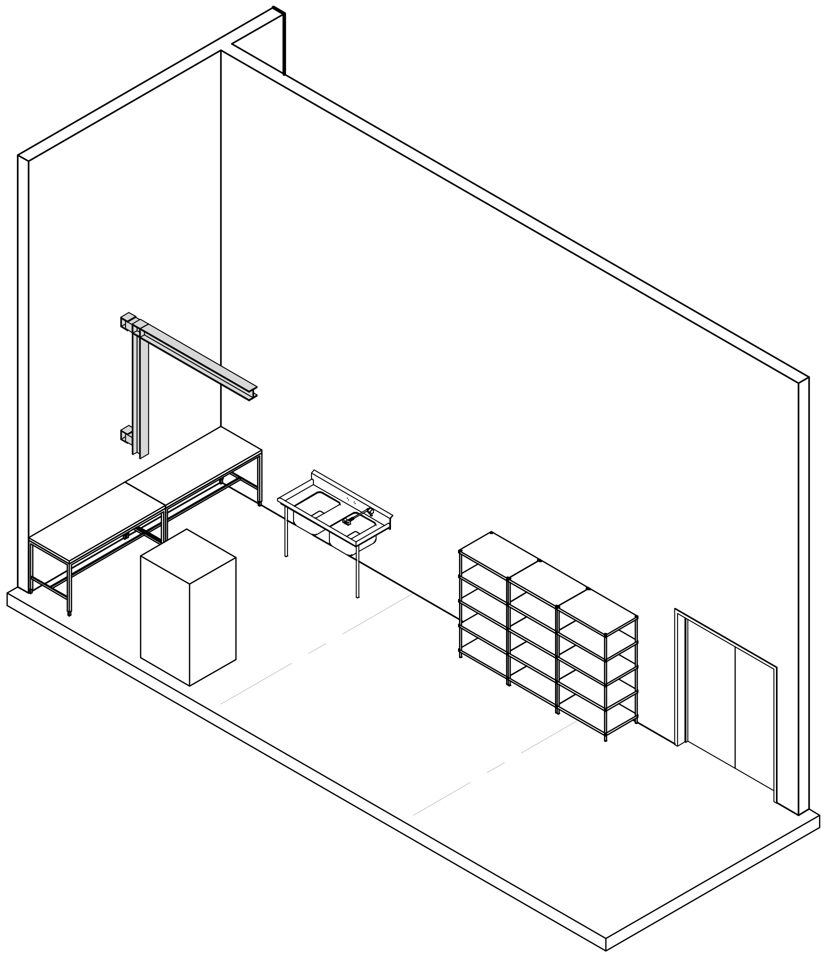
UTILITIES / SYSTEMS

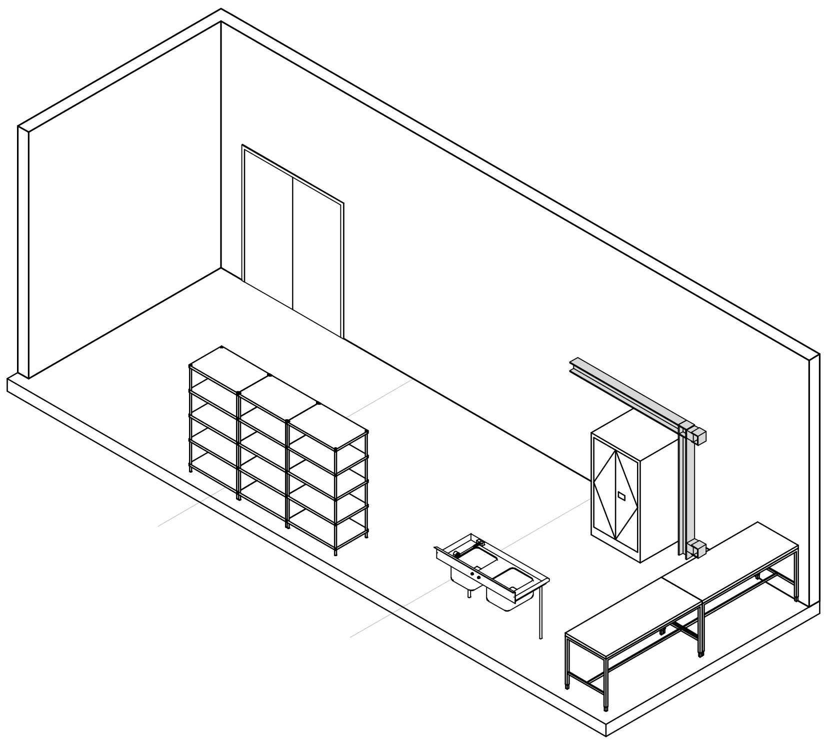
U30	HOT & COLD WATER, LAB
U38	EYEWASH

SPECIALTY EQUIPMENT

E507	0.5t WALL MOUNTED JIB CRANE

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.7		**RDS: 015-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: SPIN RIG PREP ROOM**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: SPIN RIG — SECONDARY ADJACENCY: CONTROL ROOM SPIN RIG — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	SPACE ID#: 3.8	RDS-016-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 29.16	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	TGST RIG
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Thermal Gradient and Shock Test Rig Laboratory. Combustion/Emission Laboratory. Soundproofing is required (SPLs up to 120 dB/Threshold of discomfort). Requires open space for equipments layout.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE (OTHER-DEFINE): ________________
- INTEGRAL COVE: YES
- OTHER / COMMENTS: CONCRETE CURB UPSTAND

WALL TYPE / CONSTRUCTION
- WALL TYPE: CONCRETE
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: 4m
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS
- LABORATORY EQUIPMENT CAN RUN 24/7
- ACCESS TO LAB EQUIPMENT OUTSIDE REGULAR HOURS NEEDED

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER/COMMENTS:

CONTROLS
- CONTROLS TYPE: VARIABLE AIR VOLUME
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: COMBUSTION EXHAUST
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:
- - COMBUSTION EXHAUST CAPTURED THRU EXTRACTION ARM

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: PROPYLENE GAS DETECTION SYSTEM
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES
- COMMENTS: NRC TO PROVIDE LIST OF GASES USED IN COMBUSTION PROCESS CONSIDERATION FOR GAS DETECTION.

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: YES (UTILITY @ WORKBENCHES)
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- PROCESS COOLING WATER: YES FOR FUTURE FLEXIBILITY
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE: GAS CYLINDER SYSTEM
- GAS TYPES: N/A
- COMMENTS: COMBUSTION GASES: PROPYLENE, PROPANE, HYDROGEN (FUTURE)
- - OXYGEN USED AS OXIDIZER
- - PORTABLE GAS CYLINDERS OUTDOORS ADJACENT TGST ROOM
- - ALL COMBUSTION COMPLETE THROUGH GASES. NO FUEL REQUIRED.

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: SINGLE POINT
- TRAP DEPTH: 75mm OR 100mm
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):

HAZARD 1
- Potential CO and CO2 when rig is running.

HAZARD 2

HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

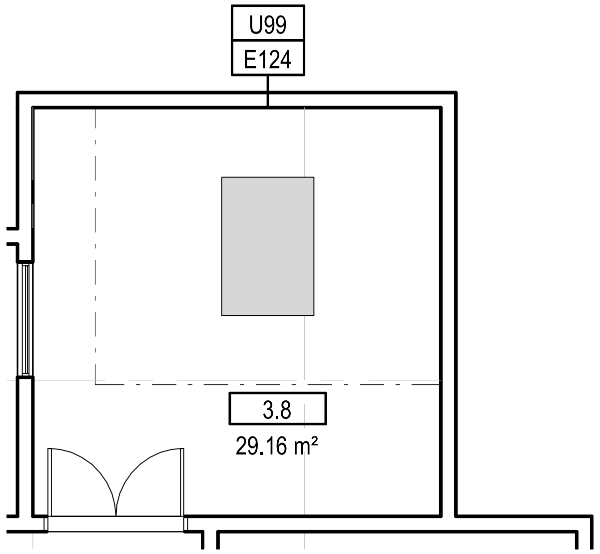
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: YES
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- CONDUIT PATHWAY TO CONTROL ROOM FOR POWER AND COMMS

LIGHTING
- SPECIALIZED LIGHTING: YES
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: NO
- NIGHT LIGHT:
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS:
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:
- VAPOUR TIGHT STRIP LIGHTS

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION:
- PUBLIC PAGING:N/A
- INTERCOM: NO
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:
- LOCAL CAMERA CONNECTION TO CONTROL ROOM

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV: SAFETY TYPE
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.8	**RDS: 016-2**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:	**SPACE NAME: TGST RIG**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: CONTROL ROOM TGST — SECONDARY ADJACENCY: HOT ISOSTATIC PRESS,GAS CYLINDER STORAGE — TERTIARY ADJACENCY		



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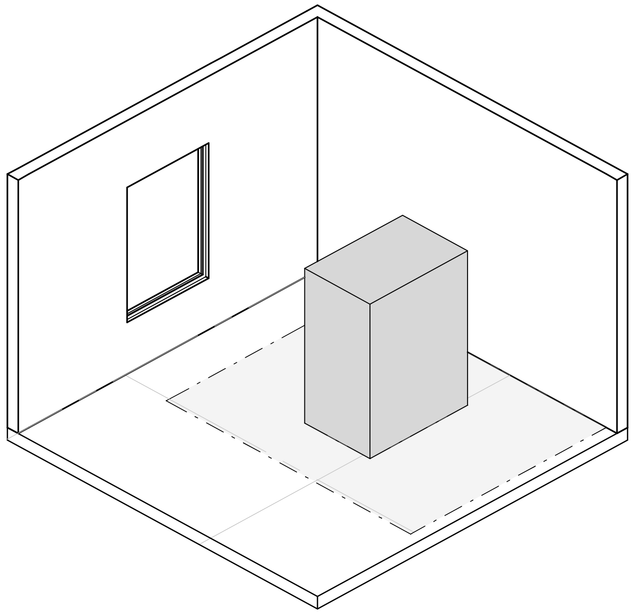
016-2
3.8 - TGST RIG
1 : 100

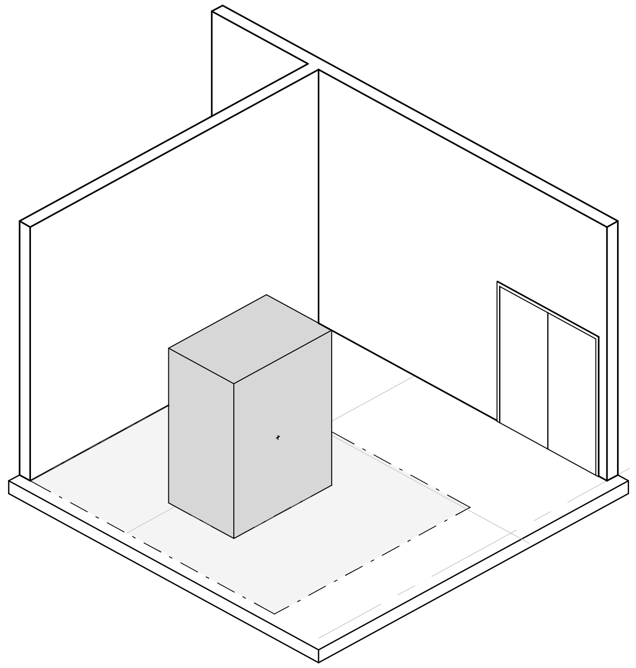
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
		U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT			
E124	THERMAL GRADIENT TEST RIG		

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.8		**RDS: 016-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY			**SPACE NAME: TGST RIG**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: CONTROL ROOM TGST — SECONDARY ADJACENCY: HOT ISOSTATIC PRESS,GAS CYLINDER STORAGE — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	SPACE ID#: 3.9	**RDS-017-1**
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 103.68	**Space Name:**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	**HTM R&D LAB**
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Part of Heat Treatment and Research Laboratories. Room requires work surface areas and open space to layout equipment		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS: EPOXY PAINT COATING

FLOOR BASE
- TYPE (OTHER-DEFINE): ________________
- INTEGRAL COVE: YES
- OTHER / COMMENTS: EPOXY PAINT COVE BASE

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS: GYP. BOARD ACCEPTABLE IF MASONRY NOT REQUIRED FOR PROGRAM

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: YES
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: STAINLESS STEEL
- OTHER / COMMENTS: WORKBENCH, OPEN STORAGE SHELVING, TALL STORAGE CABINET, STAINLESS STEEL REQUIRED FOR EQUIPMENT BENCHES (NOT REQUIRED FOR CENTER WORK BENCHES)
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: YES
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS: NATURAL LIGHT PREFERRED

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS
- LABORATORY EQUIPMENT CAN RUN 24/7
- ACCESS TO LAB EQUIPMENT OUTSIDE REGULAR HOURS NEEDED

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: CANOPY HOOD EXHAUST
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR
- EQ. EXHAUST: VACUUM FURNACE
- MECHANICAL NOISE (DECIBELS / NC): NC45
- OTHER / COMMENTS:
- - E138 VACUUM FURNACE: VACUUM PUMP EXHAUST TO OUTDOOR. LOCAL HEAT SOURCE CAPTURE OVER FURNACE.
- - CANOPY HOOD EXHAUST C/W LOCAL ENABLE/DISABLE SWITCH

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: ARGON GAS DETECTION AT LOW LEVEL
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: YES
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- PROCESS COOLING WATER: YES
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE: GAS CYLINDER SYSTEM
- GAS TYPES: UHP ARGON

PLUMBING

FIXTURES
- SINK TYPES: SS DOUBLE BASIN
- SINK DEPTH:
- SINK COUNTS: 1
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP: NO
- PEGBOARD:
- FAUCET TYPE: MIXING, GOOSENECK, DECK MOUNTED
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
- COMMENTS: EYEWASH INTEGRATED WITH SINK

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):

HAZARD 1
- CHEMICAL, SMALL AMOUNTS

HAZARD 2

HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

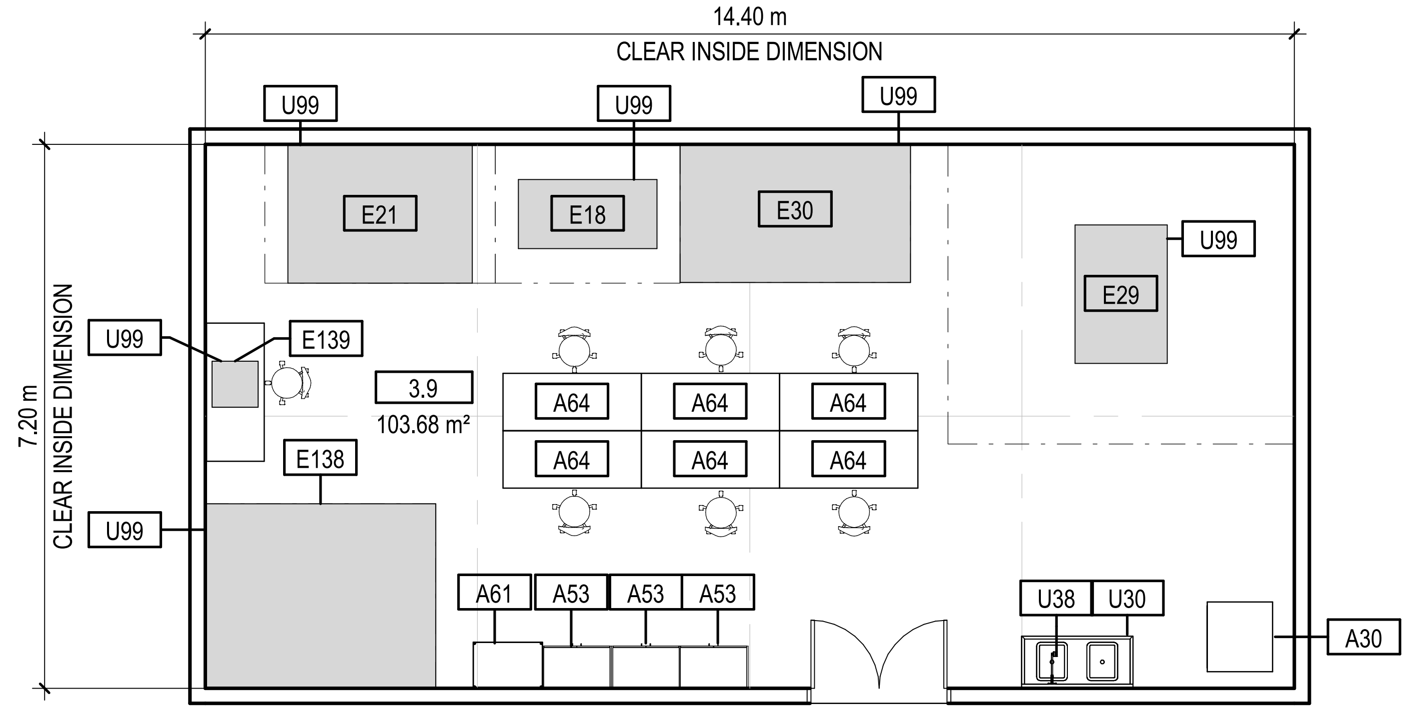
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2: 480V / XXX / 3 PH
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING:
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY:
- PLUG SPACING: 1m
- FLOOR BOX W TRENCH: YES
- OTHER / COMMENTS:
- WIREMOLD ABOVE WORKBENCHES
- POWER FROM BELOW TO FEED BENCHES IN MIDDLE OF ROOM

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.9	**RDS: 017-2**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY		**SPACE NAME: HTM R&D LAB**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: HOT ISO-STATIC PRESS — SECONDARY ADJACENCY: HEAT TREATMENT AND COATING LAB — TERTIARY ADJACENCY: GAS CYLINDER STORAGE		



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3.9 - HTM R&D LAB

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LEGEND

ARCHITECTURAL SYSTEMS

A64	WORKBENCH, MOBILE
A61	STORAGE SHELVING, TALL, OPEN 36"
A53	CASEWORK, TALL STORAGE CABINET
A30	FLAMMABLE STORAGE CABINET

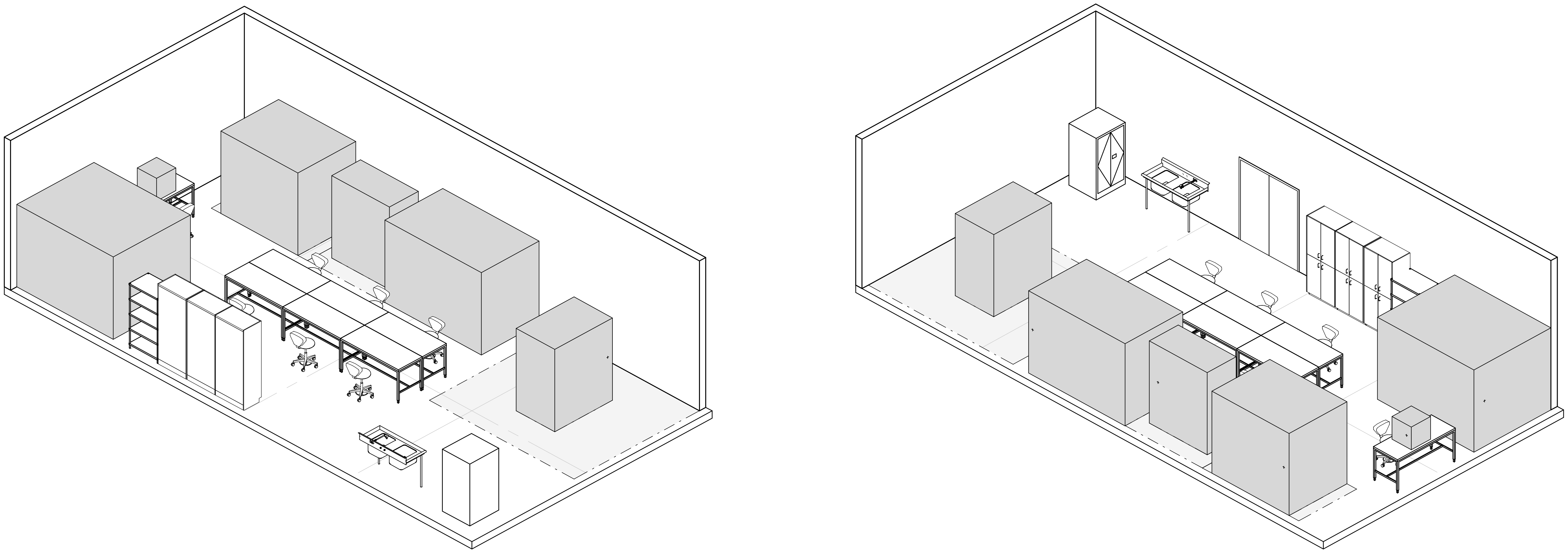
UTILITIES / SYSTEMS

U30	HOT & COLD WATER, LAB
U38	EYEWASH
U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E18	THERMO GRAVIMETRIC ANALYZER
E21	HYDROGEN VOLUMETRIC SORPTION ANALYZER
E29	MICRO-MECHANICAL TEST FRAME
E30	GLOVE BOX - MATERIAL PROCESSING FAC
E138	VACUUM FURNACE, BARBER COLEMAN MODEL IR77
E139	ZETA POTENTIOMETER

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.9		**RDS: 017-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY			**SPACE NAME: HTM R&D LAB**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: HOT ISO-STATIC PRESS — SECONDARY ADJACENCY: HEAT TREATMENT AND COATING LAB — TERTIARY ADJACENCY: GAS CYLINDER STORAGE			



REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	SPACE ID#: 3.10	**RDS-018-1**
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: N/A		AREA (m2): 38.88	**Space Name:**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	**HOT ISOSTATIC PRESS**
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Part of Heat Treatment and Research Laboratories. Room requires large open area to accommodate hot isostatic press. Requires gas purging to outside, 550v. Mid-bay height is required to install a 2 tonne crane and maintain clear ceiling height for the press.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE:
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: (OTHER-DEFINE)
- FINISH: (IF APPLICABLE)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS: 7 m HEIGHT TO U/S CEILING

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: N/A
- CASEWORK MATERIAL: N/A
- DEPTH: N/A
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE:
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: N/A
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS: REQUIRES PRESSURE RESISTANT DOOR

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALTY EXHAUST: ARTICULATING EXTRACTION ARM OVER BENCH
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR
- EQ. EXHAUST: VACUUM FURNACE
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:
- - E2 & E10 VACUUM FURNACE: VACUUM PUMP EXHAUST TO OUTDOOR
- - PRESSURE RELIEF, VENTING THROUGH EXTERIOR WALL

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: ARGON GAS SENSOR (LOW LEVEL)
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: YES
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- PROCESS COOLING WATER: YES (TO HIP AND VALVED OUTLETS OF CANNING MACHI
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE: GAS CYLINDER SYSTEM
- GAS TYPES: UHP ARGON
- OTHER/COMMENTS: FULL PRESSURE FROM MANIFOLD SYSTEM IN CYLINDER ROOM WITH PIPELINE CONNECTED DIRECTLY TO HIP.

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE: N/A
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):

HAZARD 1
- POTENTIAL FOR ASPHYXIANTS (NOBEL GASSES Ag, N2)

HAZARD 2

HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: Locally reinforce for press (~20 kN)
- 0.5 t wall mounted jib crane

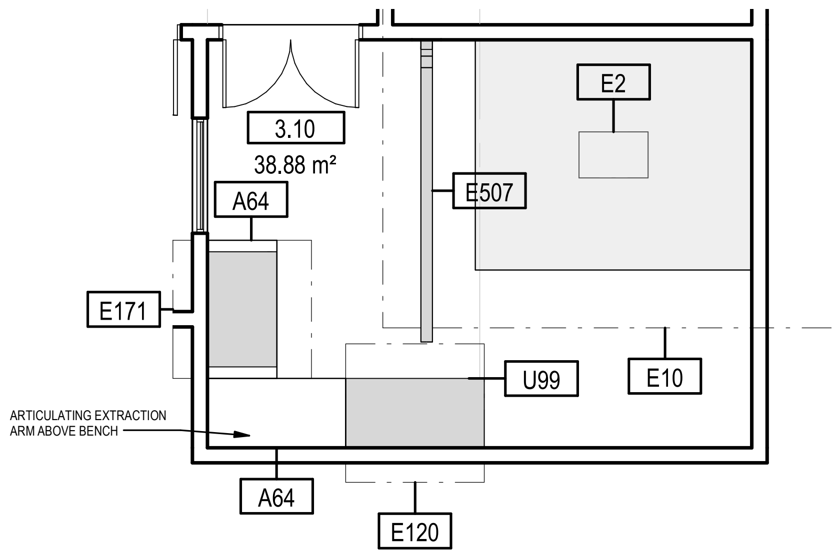
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2: 600V / XXX / 3 PH
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: N/A
- OTHER / COMMENTS:

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: NO
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS:
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: NO
- CABLE TRAY TYPE:
- OTHER / COMMENTS:
- EQUIPMENT DATA CONNECTION REQUIRED?

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.10	RDS: 018-2
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY		SPACE NAME: HOT ISOSTATIC PRESS
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: CONTROL ROOM HOT ISO PRESS — SECONDARY ADJACENCY: TGST RIG,GAS CYLINDER STORAGE — TERTIARY ADJACENCY		



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3.10 - HOT ISOSTATIC PRESS
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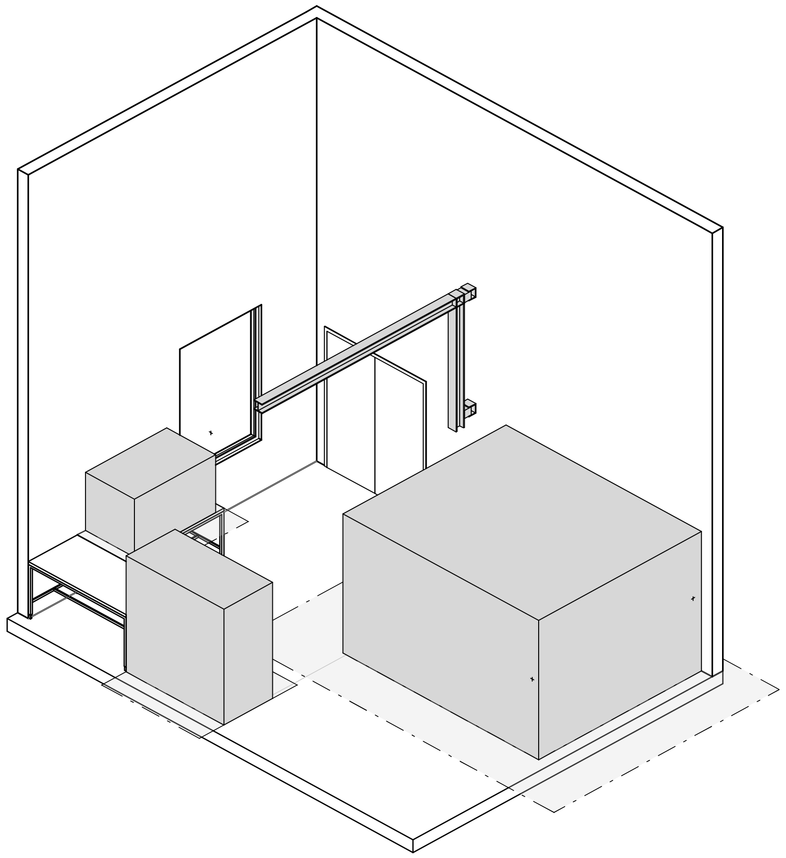
LEGEND

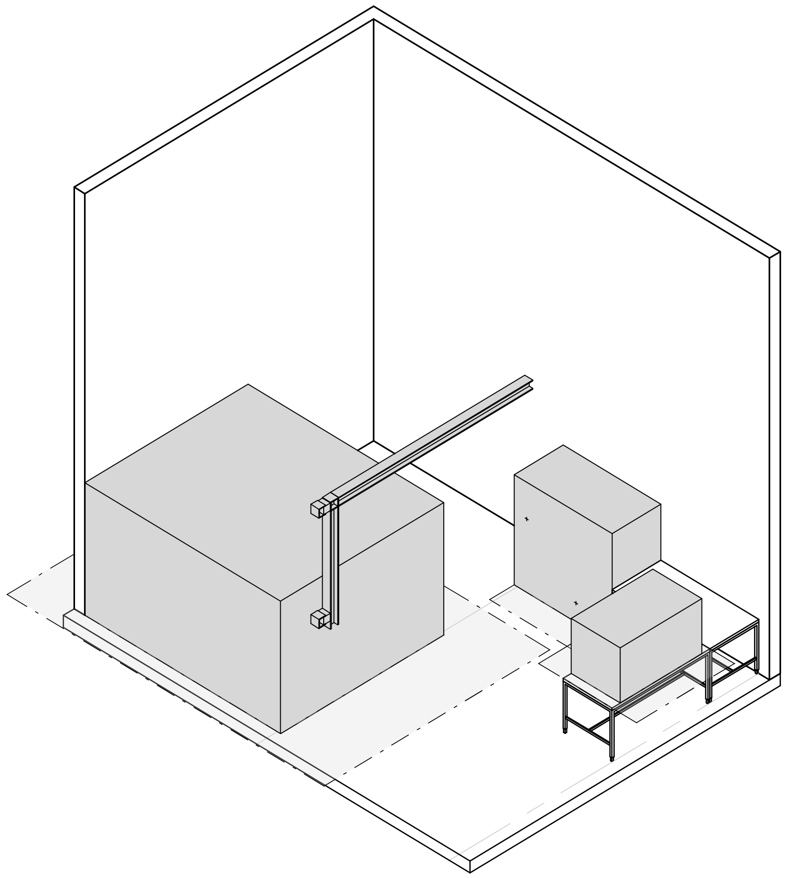
ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A64	WORKBENCH, MOBILE	U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E2	FURNANCE - HEAT TREATING
E10	HOT ISOSTATIC PRESS
E120	GLOVE BOX
E171	CANNING STATION PUMP
E507	0.5t WALL MOUNTED JIB CRANE

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.10		**RDS: 018-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: HOT ISOSTATIC PRESS**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: CONTROL ROOM HOT ISO PRESS — SECONDARY ADJACENCY: TGST RIG,GAS CYLINDER STORAGE — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	SPACE ID#: 3.11	**RDS-019-1**
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: N/A		AREA (m2): 25.92	**Space Name:**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	**CONTROL ROOM HOT ISO**
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Part of Heat Treatment and Research Laboratories. Control room for hot isostatic press and TGST rig. Requires space for two workstations and direct entrances to hot isostatic press and TGST rig.		**PRESS & TGST RIG**

ARCHITECTURAL

FLOOR FINISH
TYPE: SHEET VINYL
SLIP RESISTANCE:
ANTI-STATIC RESISTANCE:
OTHER / COMMENTS:

FLOOR BASE
TYPE: SHEET VINYL
INTEGRAL COVE: YES
OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
WALL TYPE: MASONRY
SHIELDING:
IMPACT RESISTANT:
WATER RESISTANT:
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE:
WALL FINISH: PAINT
OTHER / COMMENTS: ADD ONE LAYER OF 5/8" GYP.

CEILING
CEILING TYPE: TILE CEILING (HUNG)
HEIGHT: 4m
FINISH: ACOUSTIC TILE
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE:
OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
GASEOUS DECONTAMINATION:
SURFACE DECONTAMINATION:
FIRE EXTINGUISHER CABINET:
CRANE SUPPORT
ELECTROMAGNETIC SHIELDING:
PENETRATION SEALING:
OTHER / COMMENTS:

CASEWORK / MILLWORK
CASEWORK SYSTEM: F-FRAME
CASEWORK MATERIAL: PAINTED METAL
DEPTH: (OTHER-DEFINE)
UPPER CABINETS: N/A
HEIGHT ADJUSTABLE:
BASE CABINETS: N/A
COUNTERTOP MATERIAL:
OTHER / COMMENTS: TALL STORAGE CABINET

CHEMICAL STORAGE:
ACID:
BASE:
FLAMMABLE LIQUIDS:
STORAGE CABINET: YES
STORAGE DRAWER UNIT: NO
SHIELDED STORAGE UNIT: NO
OVERHEAD SERVICE CARRIER: NO

OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
NATURAL LIGHT: NOT REQUIRED
WINDOWS:
OPERABLE:
SAFETY GLAZING:
SAFETY ETCHING:
SHADE CONTROL:
OTHER / COMMENTS: NATURAL LIGHT PREFERRED

DOORS/ HARDWARES
DOOR TYPE: DOUBLE
PRIMARY LEAF: 900 mm x 2150 mm
SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
VISION PANEL: BOTH LEAVES
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE: BOTH SIDES
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS: MULTIPLE DOORS AT VARIOUS LOCATIONS

DOOR TYPE:
PRIMARY LEAF:
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

DOOR TYPE:
PRIMARY LEAF:
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE

PRIMARY CONTAINMENT DEVICE:
PRIMARY CONTAINMENT DEVICE:
OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS

ACCESSIBILITY ELEMENT 1:
ACCESSIBILITY ELEMENT 2:
ACCESSIBILITY ELEMENT 3:
ACCESSIBILITY ELEMENT 4:

ADDITONAL USER COMMENTS

GLAZING PANELS TO ADJACENT CORRIDOR PREFERRED
C/W BLINDS

SUSTAINABILITY REQUIREMENTS

SPACE REQUIRED FOR RECYCLING BIN (m^2):
SPACE REQUIRED FOR COMPOSTING BIN (m2):
UNOCCUPIED PERIOD TEMP. SET BACK:
TEMPERATURE SET BACK MAXIMUM (ºC):
TEMPERATURE SET BACK MINIMUM (ºC):
INDIVIDUAL TEMPERATURE CONTROL:
OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
SETPOINTS (SUMMER): 25ºC
SETPOINTS (WINTER): 21ºC
+/- 1ºC

CONTROLS
CONTROLS TYPE: ALL DIGITAL
CONTROLS FRAMEWORK: BACNet OVER IP
OTHER / COMMENTS:
- UNOCCUPEID TIME TEMPERATURE SETBACK

HUMIDITY
STATS: ZONE
SETPOINTS (SUMMER): 50% RH
SETPOINTS (WINTER): 30% RH
+/- 5% RH
TRIM HUMIDIFICATION: NO

VENTILATION
AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
ROOM FILTRATION - EXHAUST: NONE
ROOM FILTRATION - SUPPLY: NONE
AIR CIRCULATION METHOD: 100% SUPPLY
SPECIALITY EXHAUST: N/A
DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
DIRECTIONAL AIRFLOW METHOD: FORCED
PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
ROOM ISOLATION DAMPERS: NONE
FILTRATION TYPE: N/A
PRESSURE AIRFLOW INDICATOR: NONE
EQ. EXHAUST: N/A
MECHANICAL NOISE (DECIBELS / NC): NC45
OTHER / COMMENTS:

MONITORING AND ALARMS
PRESSURE / AIRFLOW INDICATOR: NO
EQUIPMENT MONITORING POINTS: NO
HVAC ALARM RELATIVE PRESSURIZATION: NO
ANIMAL ROOM MONITORING SYSTEM: NO
GAS DETECTION: NO
LIQUID / LEAK DETECTION: NO
TEMP / HUMIDITY: YES

PROCESS PIPING
PROCESS WATER: NO
STEAM: NO
COMP. AIR: NO
BREATHING AIR: NO
ANIMAL WATER: NO
PURIFIED WATER: NO
OTHER PROCESS FLUIDS:
OTHER PROCESS FLUIDS:

GASES
SUPPLY SYSTEM TYPE:
GAS TYPES: N/A

PLUMBING

FIXTURES
SINK TYPES: N/A
SINK DEPTH:
SINK COUNTS:
SINK DIMENSIONS:
INTEGRAL TO CASEWORK / BENCHTOP:
PEGBOARD: NO
FAUCET TYPE: N/A
PIPING MATERIAL TYPE:
SIZE DIAMETER:
VENT SIZE DIAMETER:
SAFETY EMERGENCY SHOWER ANSI 358.1: NO
CORROSIVE MATERIAL:
SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
FLOOR DRAIN: N/A
TRAP DEPTH:
MATERIAL
HEPA FILTERED PLUMBING VENTS:
EFFLUENT DECONTAMINATION SYSTEM
EFFLUENT pH CONTROL
OTHER / COMMENTS:

FIRE PROTECTION / ALARM

HAZARD CLASS:
SPRINKLER SYSTEM: YES
SPRINKLER SYSTEM TYPE: WET PIPE
FIRE DETECTION: NORMAL (TO CODE)
ALARM METHOD: NORMAL
OTHER / COMMENTS:

HAZARDS

BUILDING HAZARD CLASS (NBC / NSF):
HAZARD 1
HAZARD 2
HAZARD 3

STRUCTURAL

STRUCTURAL DESIGN IMPLICATIONS:
ROLLING LOAD LIMITS:
VIBRATION CRITERA:
FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
STRUCTURAL SHIELD REQUIREMENT:
CEILING LOADING:
SPECIAL PENETRATIONS:
OTHER / COMMENTS:

ELECTRICAL / POWER

CLASS TYPE: NORMAL
VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
VOLTAGE / CURRENT / PH 2: 600V / XXX / 3 PH
SPECIAL NEMA PLUG ARRANGEMENT:
POWER DENSITY:
OVERHEAD SERVICE CARRIER: N/A
ISOLATED GROUNDING: YES
GROUND FAULT PROTECTION: N/A
WEATHER PROOF COVER: N/A
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
TYPE IP RATING HERE:
RACEWAY: N/A
PLUG SPACING: 1m
FLOOR BOX W TRENCH: NO
OTHER / COMMENTS:
PATHWAY TO HIP CONTROL CONSOLE

LIGHTING

SPECIALIZED LIGHTING: NO
SPECIALIZED CONTROL: NO
MOUNT: RECESSED CEILING
FIXTURE OUTPUT: DIRECT
LIGHT LEVEL (LUX):
LIGHT COLOUR TEMP (KELVIN): 4000
DIMMING SYSTEM: YES
WHITE TUNING:
TASK LIGHTING: NO
SCENE/ZONE CONTROL: YES
OCCUPANCY SENSORS: YES
NIGHT LIGHT: NO
DAYLIGHT CONTROL: NO
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
SAFETY LIGHTS: NO
A/V EQUIPMENT INTERFACE: NO
OTHER / COMMENTS:

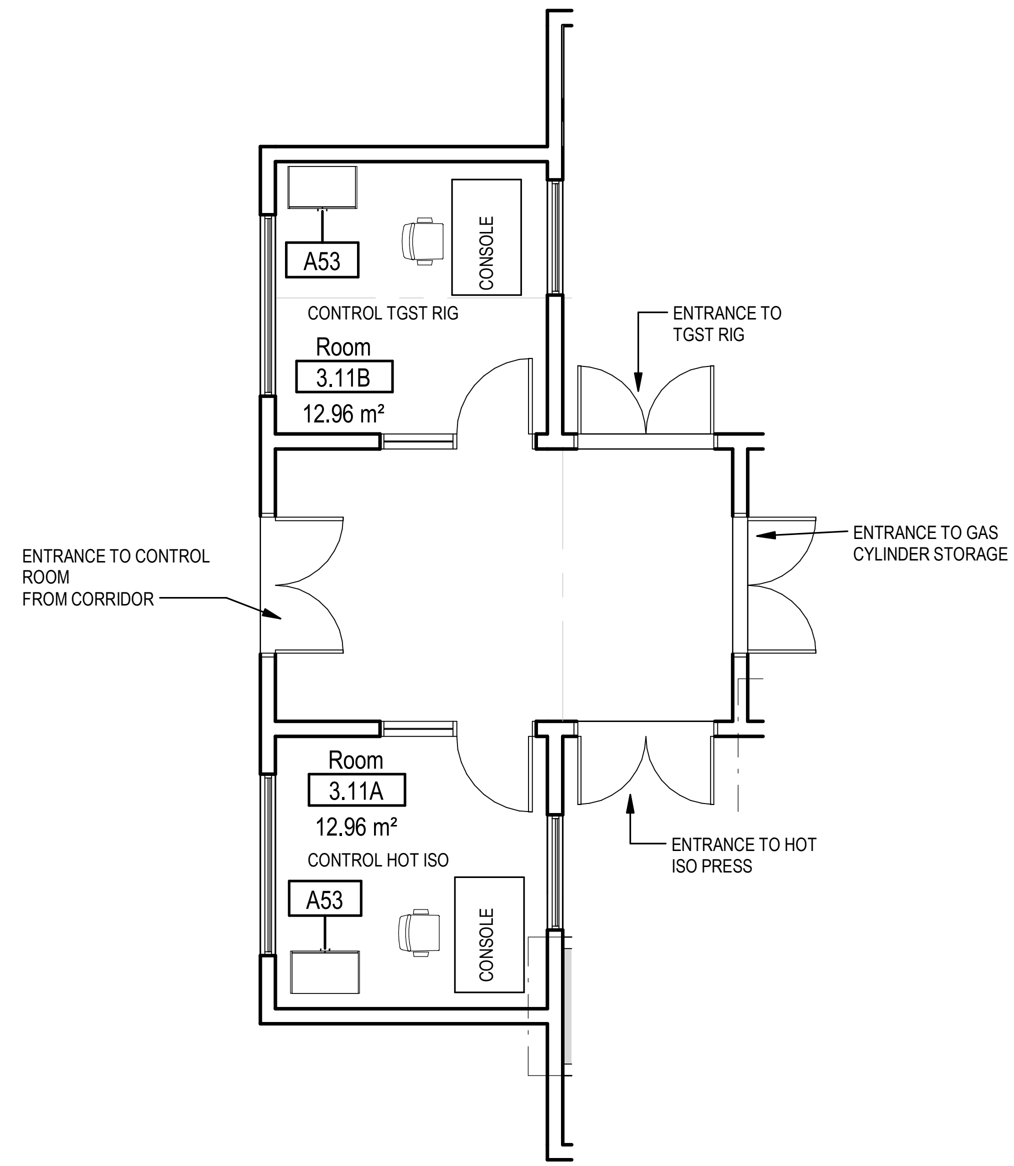
COMMUNICATIONS

PHONE: YES
CELLULAR COMMUNICATION:
PUBLIC PAGING: YES
INTERCOM:
DATA TYPE / POINTS: COPPER RJ45
DATA PLUG SPACING:
WIRELESS: YES
CABLE TRAY TYPE:
OTHER / COMMENTS:

SECURITY

CONNECTION TO CENTRAL MONITORING STATION:
CCTV:
EMERGENCY DISTRESS CALL:
FAIL-SAFE HARDWARE:
INTRUDER SYSTEM:
ACCESS CONTROL (OPTIONS BELOW)
-
-
-
-
SECURITY EQUIPMENT:
SECURITY ZONES:
OTHER / COMMENTS:
Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.11	**RDS: 019-2**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:	**SPACE NAME: CONTROL ROOM HOT ISO PRESS & TGST RIG**
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: HOT ISO-STATIC PRESS, TGST RIG — SECONDARY ADJACENCY: GAS CYLINDER STORAGE — TERTIARY ADJACENCY		



1 (019-2) 3.11 - CONTROL ROOM HOT ISO PRESS & TGST RIG

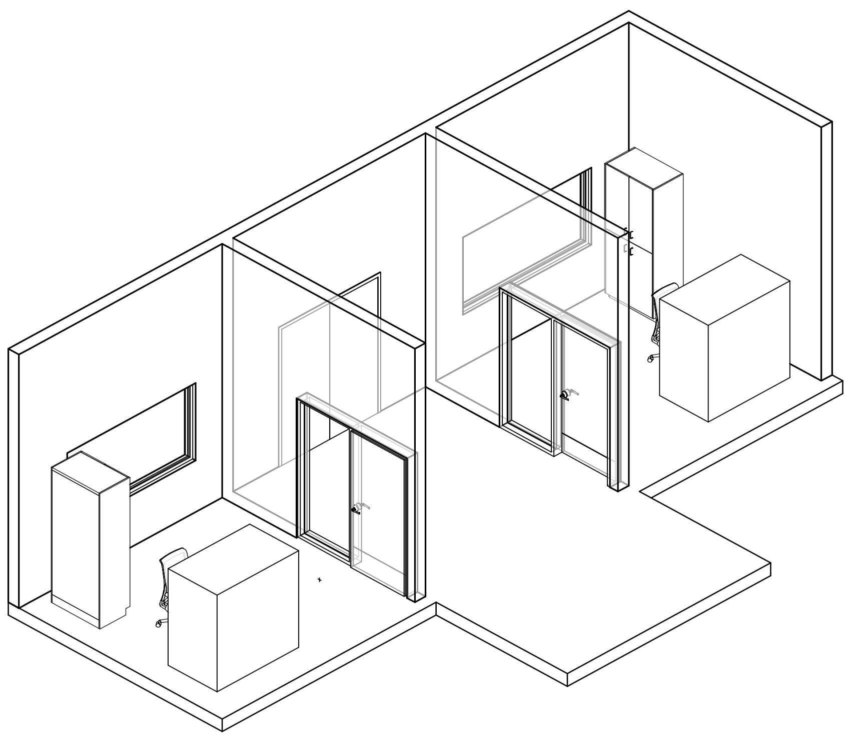
1 : 100

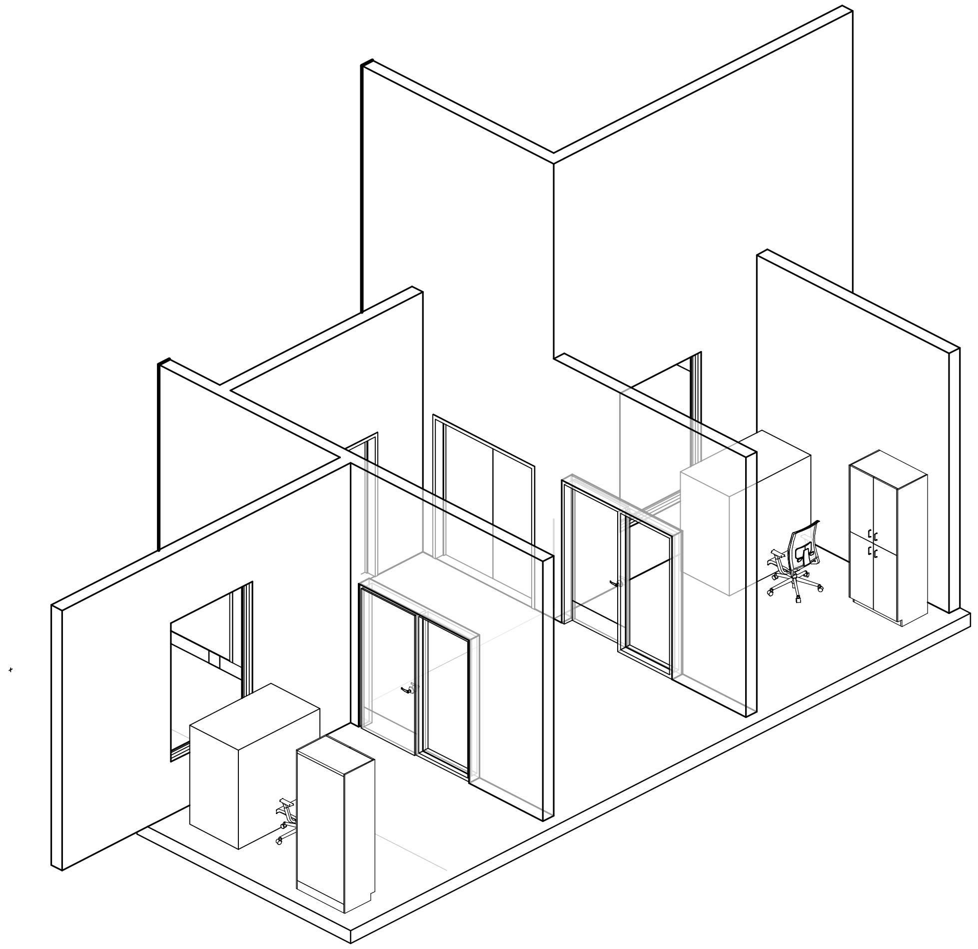
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A53	CASEWORK, TALL STORAGE CABINET		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.11		**RDS: 019-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: CONTROL ROOM HOT ISO PRESS & TGST RIG**
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: HOT ISO-STATIC PRESS, TGST RIG — SECONDARY ADJACENCY: GAS CYLINDER STORAGE — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	SPACE ID#: 3.12	RDS-020-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 48.60	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	HTM PREP ROOM
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES: Part of Heat Treatment and Research Laboratories. Room used for instrumentation and welding assembly. Mid-bay height is preferable.			

ARCHITECTURAL

FLOOR FINISH
TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
SLIP RESISTANCE:
ANTI-STATIC RESISTANCE:
OTHER / COMMENTS:

FLOOR BASE
TYPE: RUBBER
INTEGRAL COVE:
OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
WALL TYPE: MASONRY
SHIELDING:
IMPACT RESISTANT:
WATER RESISTANT:
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE:
WALL FINISH: PAINT
OTHER / COMMENTS:

CEILING
CEILING TYPE: OPEN CEILING
HEIGHT: 4m
FINISH: OPEN CEILING (PAINTED)
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE:
OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
GASEOUS DECONTAMINATION:
SURFACE DECONTAMINATION:
FIRE EXTINGUISHER CABINET:
CRANE SUPPORT
ELECTROMAGNETIC SHIELDING:
PENETRATION SEALING:
OTHER / COMMENTS:

CASEWORK / MILLWORK
CASEWORK SYSTEM: MODULAR LEG FRAMED
CASEWORK MATERIAL: PAINTED METAL
DEPTH: (OTHER-DEFINE)
UPPER CABINETS: N/A
HEIGHT ADJUSTABLE: YES
BASE CABINETS: N/A
COUNTERTOP MATERIAL: STAINLESS STEEL
OTHER / COMMENTS: MOBILE TOOL CABINET,WORKBENCH, MOBILE STORAGE DRAWERS CABINET,

CHEMICAL STORAGE:
ACID:
BASE:
FLAMMABLE LIQUIDS:
STORAGE CABINET: YES
STORAGE DRAWER UNIT: YES
SHIELDED STORAGE UNIT: NO
OVERHEAD SERVICE CARRIER: NO
OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
NATURAL LIGHT: NOT REQUIRED
WINDOWS:
OPERABLE:
SAFETY GLAZING:
SAFETY ETCHING:
SHADE CONTROL:
OTHER / COMMENTS: NATURAL LIGHT PREFERRED

DOORS/ HARDWARES
DOOR TYPE: DOUBLE
PRIMARY LEAF: 900 mm x 2150 mm
SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE: BOTH SIDES
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

DOOR TYPE:
PRIMARY LEAF:
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

DOOR TYPE:
PRIMARY LEAF:
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
PRIMARY CONTAINMENT DEVICE:
PRIMARY CONTAINMENT DEVICE:
OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
ACCESSIBILITY ELEMENT 1:
ACCESSIBILITY ELEMENT 2:
ACCESSIBILITY ELEMENT 3:
ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
SPACE REQUIRED FOR RECYCLING BIN (m^2):
SPACE REQUIRED FOR COMPOSTING BIN (m2):
UNOCCUPIED PERIOD TEMP. SET BACK:
TEMPERATURE SET BACK MAXIMUM (ºC):
TEMPERATURE SET BACK MINIMUM (ºC):
INDIVIDUAL TEMPERATURE CONTROL:
OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
SETPOINTS (SUMMER): 25ºC
SETPOINTS (WINTER): 21ºC
+/- 1ºC

CONTROLS
CONTROLS TYPE: ALL DIGITAL
CONTROLS FRAMEWORK: BACNet OVER IP
OTHER / COMMENTS:
- UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
STATS: ZONE
SETPOINTS (SUMMER): 50% RH
SETPOINTS (WINTER): 30% RH
+/- 5% RH
TRIM HUMIDIFICATION: NO

VENTILATION
AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
ROOM FILTRATION - EXHAUST: NONE
ROOM FILTRATION - SUPPLY: NONE
AIR CIRCULATION METHOD: 100% SUPPLY
SPECIALITY EXHAUST: N/A
DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
DIRECTIONAL AIRFLOW METHOD: FORCED
PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
ROOM ISOLATION DAMPERS: NONE
FILTRATION TYPE: N/A
PRESSURE AIRFLOW INDICATOR: NONE
EQ. EXHAUST: N/A
MECHANICAL NOISE (DECIBELS / NC): NC50
OTHER / COMMENTS:
- EXTRACDTION ARM STATION AT SPOT WELDING BENCH & SOLDERING STATION

MONITORING AND ALARMS
PRESSURE / AIRFLOW INDICATOR: NO
EQUIPMENT MONITORING POINTS: NO
HVAC ALARM RELATIVE PRESSURIZATION: NO
ANIMAL ROOM MONITORING SYSTEM: NO
GAS DETECTION: NO
LIQUID / LEAK DETECTION: NO
TEMP / HUMIDITY: YES

PROCESS PIPING
PROCESS WATER: NO
STEAM: NO
COMP. AIR: NO
BREATHING AIR: NO
ANIMAL WATER: NO
PURIFIED WATER: NO
OTHER PROCESS FLUIDS:
OTHER PROCESS FLUIDS:

GASES
SUPPLY SYSTEM TYPE:
GAS TYPES: N/A

PLUMBING

FIXTURES
SINK TYPES: SS DOUBLE COMPARTMENT HANDWASH/UTILITY SINK
SINK DEPTH:
SINK COUNTS:
SINK DIMENSIONS:
INTEGRAL TO CASEWORK / BENCHTOP:
PEGBOARD:
FAUCET TYPE:
PIPING MATERIAL TYPE:
SIZE DIAMETER:
VENT SIZE DIAMETER:
SAFETY EMERGENCY SHOWER ANSI 358.1: NO
CORROSIVE MATERIAL: NO
SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
EYE WASH INTEGRATED WITH HANDWASH SINK

DRAINS / VENTS
FLOOR DRAIN: N/A
TRAP DEPTH: N/A
MATERIAL
HEPA FILTERED PLUMBING VENTS: NO
EFFLUENT DECONTAMINATION SYSTEM: NO
EFFLUENT pH CONTROL: NO
OTHER / COMMENTS:

FIRE PROTECTION / ALARM
HAZARD CLASS:
SPRINKLER SYSTEM: YES
SPRINKLER SYSTEM TYPE: WET PIPE
FIRE DETECTION: NORMAL (TO CODE)
ALARM METHOD: NORMAL
OTHER / COMMENTS:

HAZARDS
BUILDING HAZARD CLASS (NBC / NSF):
HAZARD 1
CHEMICAL SOLVENTS
HAZARD 2
HAZARD 3

STRUCTURAL
STRUCTURAL DESIGN IMPLICATIONS:
ROLLING LOAD LIMITS:
VIBRATION CRITERA:
FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
STRUCTURAL SHIELD REQUIREMENT:
CEILING LOADING:
SPECIAL PENETRATIONS:
OTHER / COMMENTS:

ELECTRICAL / POWER

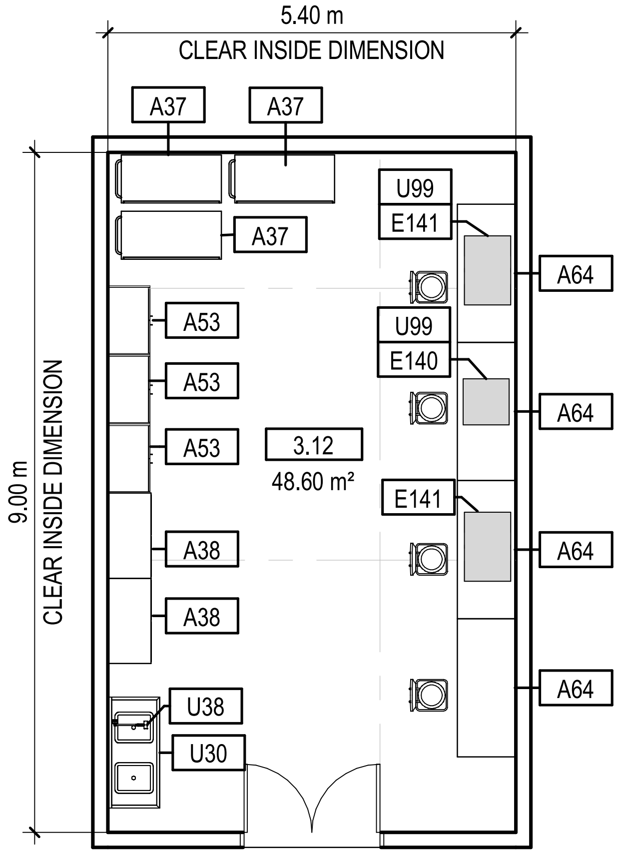
CLASS TYPE: NORMAL
VOLTAGE / CURRENT / PH 1: 208V / XXX / 3PH
VOLTAGE / CURRENT / PH 2:
SPECIAL NEMA PLUG ARRANGEMENT: NO
POWER DENSITY:
OVERHEAD SERVICE CARRIER: N/A
ISOLATED GROUNDING: N/A
GROUND FAULT PROTECTION: N/A
WEATHER PROOF COVER: N/A
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
TYPE IP RATING HERE:
RACEWAY: YES
PLUG SPACING: 1m
FLOOR BOX W TRENCH: N/A
OTHER / COMMENTS:
SURFACE RACEWAY MOUNTED ABOVE WORKBENCH

LIGHTING
SPECIALIZED LIGHTING: NO
SPECIALIZED CONTROL: NO
MOUNT: PENDANT CEILING
FIXTURE OUTPUT: DIRECT
LIGHT LEVEL (LUX):
LIGHT COLOUR TEMP (KELVIN): 4000
DIMMING SYSTEM: NO
WHITE TUNING:
TASK LIGHTING: YES
SCENE/ZONE CONTROL: NO
OCCUPANCY SENSORS: YES
NIGHT LIGHT: NO
DAYLIGHT CONTROL: NO
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
SAFETY LIGHTS:
A/V EQUIPMENT INTERFACE:
OTHER / COMMENTS:

COMMUNICATIONS
PHONE: N/A
CELLULAR COMMUNICATION:
PUBLIC PAGING: YES
INTERCOM:
DATA TYPE / POINTS: COPPER RJ45
DATA PLUG SPACING:
WIRELESS: YES
CABLE TRAY TYPE:
OTHER / COMMENTS:

SECURITY
CONNECTION TO CENTRAL MONITORING STATION:
CCTV:
EMERGENCY DISTRESS CALL:
FAIL-SAFE HARDWARE:
INTRUDER SYSTEM:
ACCESS CONTROL (OPTIONS BELOW)
-
-
-
-
SECURITY EQUIPMENT:
SECURITY ZONES:
OTHER / COMMENTS:
Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.12	RDS: 020-2
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY		SPACE NAME: HTM PREP ROOM
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MATERIAL AND COMPONENT TESTING — SECONDARY ADJACENCY: HTM R&D LAB — TERTIARY ADJACENCY: INSTRUMENTATION WORKSHOP		



1 020-2 **3.12 - HTM PREP ROOM**
1 : 100

LEGEND

ARCHITECTURAL SYSTEMS

A37	LARGE MOBILE TOOL CABINET
A38	MOBILE STORAGE CABINET, DRAWERS
A53	CASEWORK, TALL STORAGE CABINET
A64	WORKBENCH, MOBILE

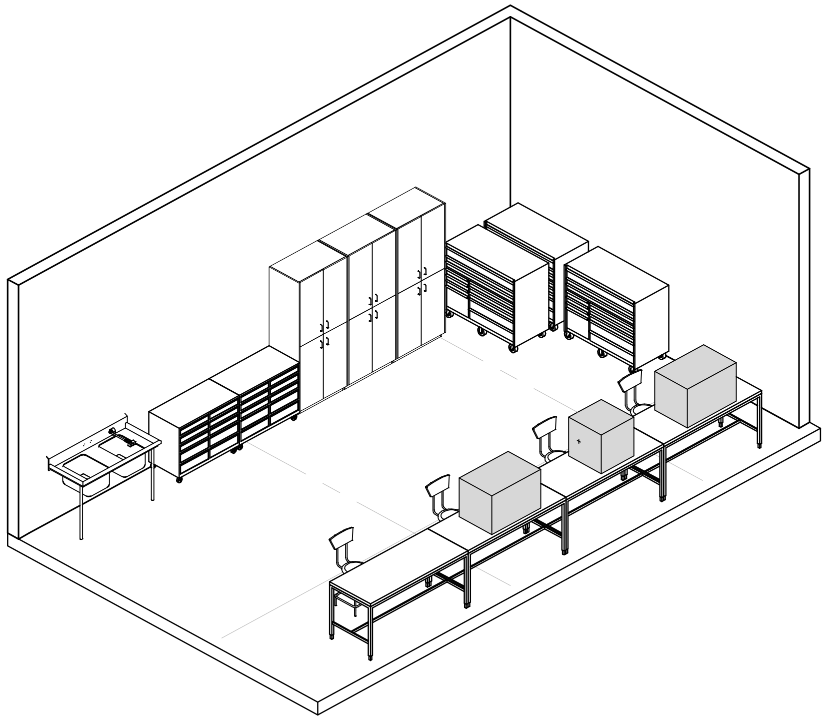
UTILITIES / SYSTEMS

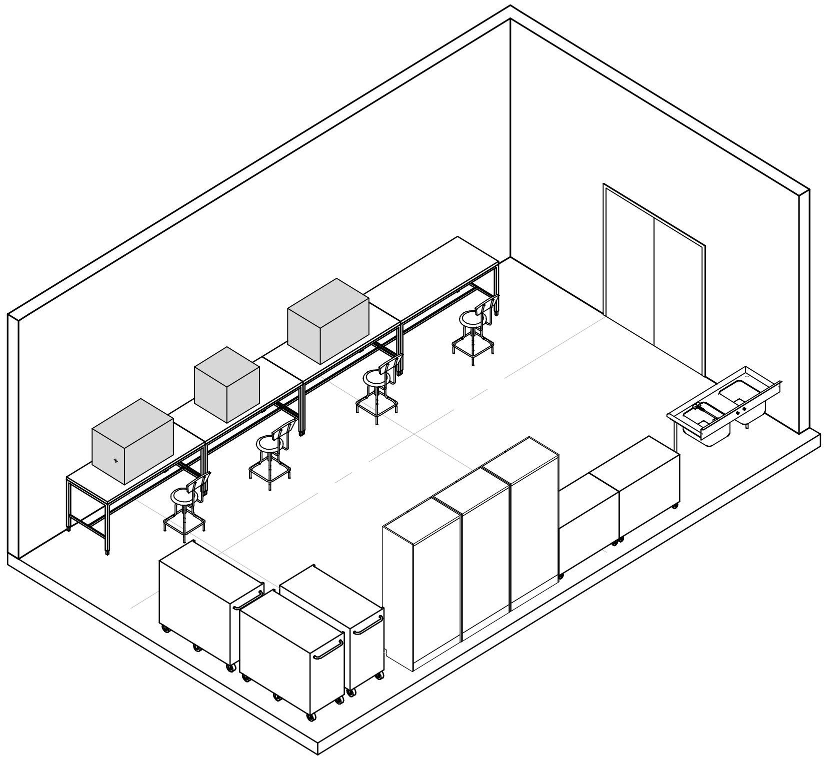
U30	HOT & COLD WATER, LAB
U38	EYEWASH
U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E140	T/C CALIBRATOR DUAL TEMP RANGE, FLUKE 518
E141	UB25/115 UB25 UNIBOND LINEAR DC POWER

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.12		**RDS: 020-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY			**SPACE NAME: HTM PREP ROOM**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MATERIAL AND COMPONENT TESTING — SECONDARY ADJACENCY: HTM R&D LAB — TERTIARY ADJACENCY: INSTRUMENTATION WORKSHOP			





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	SPACE ID#: 3.13	RDS-021-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: N/A		AREA (m2): 32.68	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	BURNER RIG CONTROL ROOM
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES: Control Room for Burner Rigs. Space for a workstation is required. Visual and direct access to burner rigs.			

ARCHITECTURAL

FLOOR FINISH
TYPE: SHEET VINYL
SLIP RESISTANCE:
ANTI-STATIC RESISTANCE:
OTHER / COMMENTS:

FLOOR BASE
TYPE: SHEET VINYL
INTEGRAL COVE: YES
OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
WALL TYPE: 5/8" GYP.
SHIELDING:
IMPACT RESISTANT:
WATER RESISTANT:
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE:
WALL FINISH: PAINT
OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
PRIMARY CONTAINMENT DEVICE:
PRIMARY CONTAINMENT DEVICE:
OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
ACCESSIBILITY ELEMENT 1:
ACCESSIBILITY ELEMENT 2:
ACCESSIBILITY ELEMENT 3:
ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
SPACE REQUIRED FOR RECYCLING BIN (m²):
SPACE REQUIRED FOR COMPOSTING BIN (m2):
UNOCCUPIED PERIOD TEMP. SET BACK:
TEMPERATURE SET BACK MAXIMUM (ºC):
TEMPERATURE SET BACK MINIMUM (ºC):
INDIVIDUAL TEMPERATURE CONTROL:
OTHER / COMMENTS:

CEILING
CEILING TYPE: TILE CEILING (HUNG)
HEIGHT: 4m
FINISH: ACOUSTIC TILE
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE:
OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
GASEOUS DECONTAMINATION:
SURFACE DECONTAMINATION:
FIRE EXTINGUISHER CABINET:
CRANE SUPPORT
ELECTROMAGNETIC SHIELDING:
PENETRATION SEALING:
OTHER / COMMENTS:

CASEWORK / MILLWORK
CASEWORK SYSTEM:
CASEWORK MATERIAL:
DEPTH:
UPPER CABINETS:
HEIGHT ADJUSTABLE:
BASE CABINETS:
COUNTERTOP MATERIAL:
OTHER / COMMENTS:
CHEMICAL STORAGE:
ACID:
BASE:
FLAMMABLE LIQUIDS:
STORAGE CABINET:
STORAGE DRAWER UNIT:
SHIELDED STORAGE UNIT:
OVERHEAD SERVICE CARRIER:
OTHER / COMMENTS:

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
NATURAL LIGHT:
WINDOWS: YES
OPERABLE:
SAFETY GLAZING:
SAFETY ETCHING:
SHADE CONTROL:
OTHER / COMMENTS:

DOORS/ HARDWARES
DOOR TYPE: DOUBLE
PRIMARY LEAF: 900 mm x 2150 mm
SECONDARY LEAF (IF APPLICABLE): 900 mm x 2150 mm
VISION PANEL: BOTH LEAVES
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE: BOTH SIDES
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

DOOR TYPE: SINGLE
PRIMARY LEAF: 1100 mm x 2150 mm
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL: PRIMARY LEAF
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE: BOTH SIDES
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS: MULTIPLE LOCATIONS

DOOR TYPE:
PRIMARY LEAF:
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
SETPOINTS (SUMMER): 25ºC
SETPOINTS (WINTER): 21ºC
+/- 1ºC
OTHER/COMMENTS:

CONTROLS
CONTROLS TYPE: VARIABLE AIR VOLUME
CONTROLS FRAMEWORK: BACNet OVER IP
OTHER / COMMENTS:
- UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK C/W LOCAL OCCUPANCY OVERRIDE. VARIABLE INTAKE AIR DAMPER LOCAL CONTROL MANUAL/AUTO IN CONJUNCTION WITH EXHAUST VSD.

HUMIDITY
STATS: ZONE
SETPOINTS (SUMMER): 50% RH
SETPOINTS (WINTER): 30% RH
+/- 5% RH
TRIM HUMIDIFICATION: NO

VENTILATION
AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
ROOM FILTRATION - EXHAUST: NONE
ROOM FILTRATION - SUPPLY: NONE
AIR CIRCULATION METHOD: 100% SUPPLY
SPECIALITY EXHAUST: N/A
DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
DIRECTIONAL AIRFLOW METHOD: FORCED
PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
ROOM ISOLATION DAMPERS: NONE
FILTRATION TYPE: N/A
PRESSURE AIRFLOW INDICATOR: NONE
EQ. EXHAUST: N/A
MECHANICAL NOISE (DECIBELS / NC): NC45
OTHER / COMMENTS:
LOW MIN. AC/Hr RATE ACHIEVED THRU DEMAND CONTROL VENTILATION SYS.

MONITORING AND ALARMS
PRESSURE / AIRFLOW INDICATOR: NO
EQUIPMENT MONITORING POINTS: NO
HVAC ALARM RELATIVE PRESSURIZATION: NO
ANIMAL ROOM MONITORING SYSTEM: NO
GAS DETECTION: NO
LIQUID / LEAK DETECTION: NO
TEMP / HUMIDITY: YES

PROCESS PIPING
PROCESS WATER: YES
STEAM: NO
COMP. AIR: YES
BREATHING AIR: NO
ANIMAL WATER: NO
PURIFIED WATER: NO
OTHER PROCESS FLUIDS:
OTHER PROCESS FLUIDS:
COMMENTS:
- PROCESS WATER: 1/2" NON POTABLE WATER SERVICE AND CONTROL VALVE ON SUPPLY TO INJECTION SYSTEM IN BURNER RIG 1 & 2 ROOM.
- UTILITY COMP. AIR TERMINAL AT WORK BENCH

GASES
SUPPLY SYSTEM TYPE:
GAS TYPES: N/A

PLUMBING

FIXTURES
SINK TYPES: SS SINGLE BASIN
SINK DEPTH:
SINK COUNTS:
SINK DIMENSIONS:
INTEGRAL TO CASEWORK / BENCHTOP:
PEGBOARD:
FAUCET TYPE:
PIPING MATERIAL TYPE:
SIZE DIAMETER:
VENT SIZE DIAMETER:
SAFETY EMERGENCY SHOWER ANSI 358.1: YES
CORROSIVE MATERIAL: NO
SAFETY EMERGENCY EYEWASH ANSI 358.1: YES

DRAINS / VENTS
FLOOR DRAIN: SINGLE POINT
TRAP DEPTH: 75mm OR 100mm
MATERIAL
HEPA FILTERED PLUMBING VENTS:
EFFLUENT DECONTAMINATION SYSTEM
EFFLUENT pH CONTROL
OTHER / COMMENTS:
- FLOOR DRAIN AT SHOWER.

FIRE PROTECTION / ALARM
HAZARD CLASS:
SPRINKLER SYSTEM: YES
SPRINKLER SYSTEM TYPE: WET PIPE
FIRE DETECTION: NORMAL (TO CODE)
ALARM METHOD: NORMAL
OTHER / COMMENTS:
- SHUT DOWN AHU AND FUEL ON FA ALARM RELAY CONTACT INTO CONSOLE.

HAZARDS
BUILDING HAZARD CLASS (NBC / NSF):
HAZARD 1
HAZARD 2
HAZARD 3

STRUCTURAL
STRUCTURAL DESIGN IMPLICATIONS:
ROLLING LOAD LIMITS:
VIBRATION CRITERA:
FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa
STRUCTURAL SHIELD REQUIREMENT:
CEILING LOADING:
SPECIAL PENETRATIONS:
OTHER / COMMENTS:

ELECTRICAL / POWER

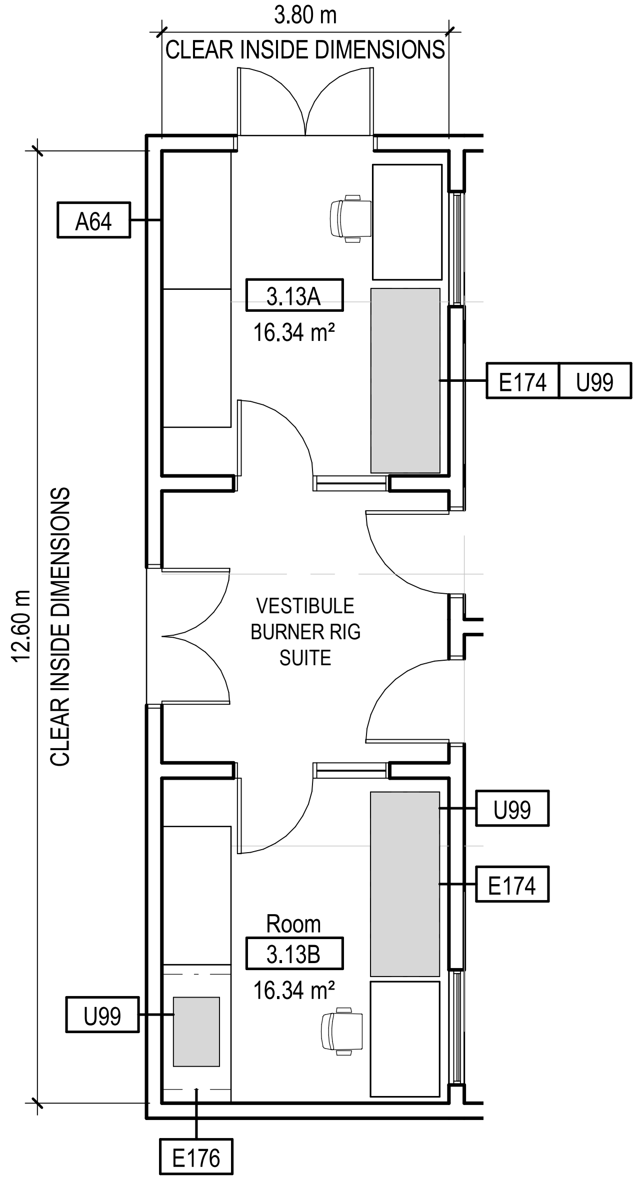
CLASS TYPE: NORMAL
VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
VOLTAGE / CURRENT / PH 2:
SPECIAL NEMA PLUG ARRANGEMENT:
POWER DENSITY:
OVERHEAD SERVICE CARRIER: N/A
ISOLATED GROUNDING: N/A
GROUND FAULT PROTECTION: N/A
WEATHER PROOF COVER: N/A
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
TYPE IP RATING HERE:
RACEWAY: N/A
PLUG SPACING:
FLOOR BOX W TRENCH: NO
OTHER / COMMENTS:
EQUIPMENT CONNECTIONS TO BURNER RIG ROOMS
EMERGENCY STOP BUTTON FOR EACH BURNER RIG

LIGHTING
SPECIALIZED LIGHTING: NO
SPECIALIZED CONTROL: NO
MOUNT: RECESSED CEILING
FIXTURE OUTPUT:
LIGHT LEVEL (LUX):
LIGHT COLOUR TEMP (KELVIN): 4000
DIMMING SYSTEM: NO
WHITE TUNING:
TASK LIGHTING: NO
SCENE/ZONE CONTROL: NO
OCCUPANCY SENSORS: YES
NIGHT LIGHT: NO
DAYLIGHT CONTROL: YES
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
SAFETY LIGHTS:
A/V EQUIPMENT INTERFACE:
OTHER / COMMENTS:
CONTROL RIG ROOM LIGHTS FROM HERE

COMMUNICATIONS
PHONE: YES
CELLULAR COMMUNICATION:
PUBLIC PAGING: YES
INTERCOM:
DATA TYPE / POINTS: COPPER RJ45
DATA PLUG SPACING:
WIRELESS: YES
CABLE TRAY TYPE: OPEN BASKET
OTHER / COMMENTS:
CABLE TRAY TO RIG ROOM

SECURITY
CONNECTION TO CENTRAL MONITORING STATION:
CCTV: SAFETY TYPE
EMERGENCY DISTRESS CALL:
FAIL-SAFE HARDWARE:
INTRUDER SYSTEM:
ACCESS CONTROL (OPTIONS BELOW)
CARD
-
-
-
SECURITY EQUIPMENT:
SECURITY ZONES:
OTHER / COMMENTS:
CAMERA TO MONITOR FLAME IN RIG ROOM
Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.13		**RDS: 021-2**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: BURNER RIG CONTROL ROOM**
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: BURNER RIG #1 AND #2 — SECONDARY ADJACENCY: BURNER RIG STORAGE — TERTIARY ADJACENCY: SPIN AND BURNER RIG EQ.SUPPORT			



3.13 - BURNER RIG CONTROL ROOM

1 / 021-2

1 : 100

LEGEND

ARCHITECTURAL SYSTEMS

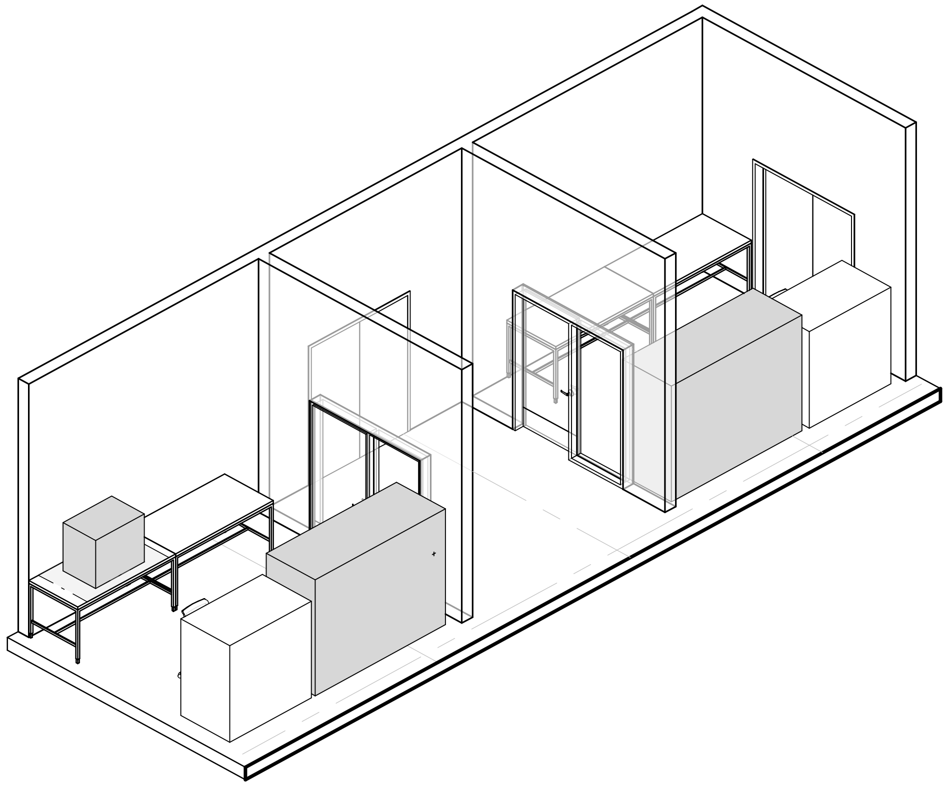
A64	WORKBENCH, MOBILE

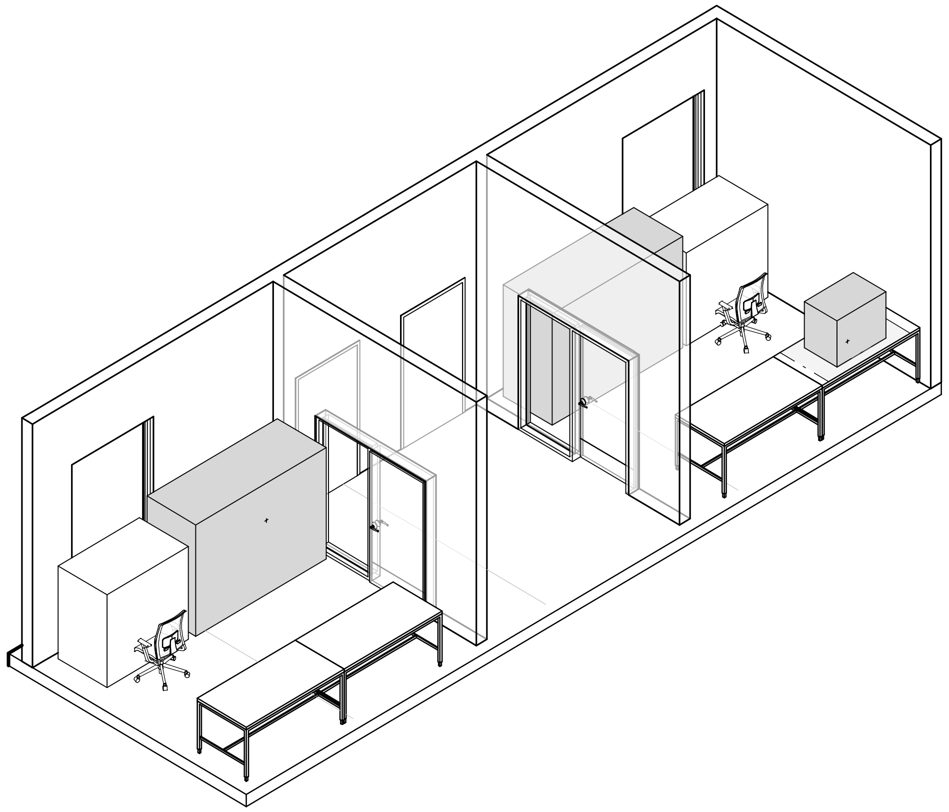
UTILITIES / SYSTEMS

SPECIALTY EQUIPMENT

E174	CONTROL CONSOLE - COMBUSTOR SYSTEM
E176	3D AUTOMATED LASER SCANNER

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.13		**RDS: 021-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY			**SPACE NAME: BURNER RIG CONTROL ROOM**
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: BURNER RIG #1 AND #2 — SECONDARY ADJACENCY: BURNER RIG STORAGE — TERTIARY ADJACENCY: SPIN AND BURNER RIG EQ.SUPPORT			





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	SPACE ID#: 3.14	RDS-022-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 44.64	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	BURNER RIG #1
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Containment/Combustion Laboratory & Fuel burning. Requires pre-action sprinkler system, fireproofing, HV exhaust & Supply, acoustical treatment, open area for equipment layout and storage cabinets, mid-bay height, and controllable daylight.		

ARCHITECTURAL

FLOOR FINISH
TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
SLIP RESISTANCE:
ANTI-STATIC RESISTANCE:
OTHER / COMMENTS:

FLOOR BASE
TYPE: RUBBER
INTEGRAL COVE:
OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
WALL TYPE: MASONRY
SHIELDING:
IMPRACT RESISTANT: YES
WATER RESISTANT:
ACOUSTIC PERFORMANCE:
PRESSURE PERFORMANCE:
WALL FINISH: PAINT
OTHER / COMMENTS:

CEILING
CEILING TYPE: OPEN CEILING
HEIGHT: 4m
FINISH: OPEN CEILING (PAINTED)
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE:
OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
GASEOUS DECONTAMINATION:
SURFACE DECONTAMINATION:
FIRE EXTINGUISHER CABINET:
CRANE SUPPORT
ELECTROMAGNETIC SHIELDING:
PENETRATION SEALING:
OTHER / COMMENTS:

CASEWORK / MILLWORK
CASEWORK SYSTEM:
CASEWORK MATERIAL:
DEPTH:
UPPER CABINETS:
HEIGHT ADJUSTABLE:
BASE CABINETS:
COUNTERTOP MATERIAL:
OTHER / COMMENTS:
CHEMICAL STORAGE:
ACID:
BASE:
FLAMMABLE LIQUIDS:
STORAGE CABINET:
STORAGE DRAWER UNIT:
SHIELDED STORAGE UNIT:
OVERHEAD SERVICE CARRIER:
OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
NATURAL LIGHT: REQUIRED
WINDOWS: YES
OPERABLE: YES
SAFETY GLAZING:
SAFETY ETCHING:
SHADE CONTROL: YES
OTHER / COMMENTS:

DOORS/ HARDWARES
DOOR TYPE: SINGLE
PRIMARY LEAF: 1100 mm x 2150 mm
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE: BOTH SIDES
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

DOOR TYPE:
PRIMARY LEAF:
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE: BOTH SIDES
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

DOOR TYPE:
PRIMARY LEAF:
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
PRIMARY CONTAINMENT DEVICE:
PRIMARY CONTAINMENT DEVICE:
OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
ACCESSIBILITY ELEMENT 1:
ACCESSIBILITY ELEMENT 2:
ACCESSIBILITY ELEMENT 3:
ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
SPACE REQUIRED FOR RECYCLING BIN (m^2):
SPACE REQUIRED FOR COMPOSTING BIN (m2):
UNOCCUPIED PERIOD TEMP. SET BACK:
TEMPERATURE SET BACK MAXIMUM (ºC):
TEMPERATURE SET BACK MINIMUM (ºC):
INDIVIDUAL TEMPERATURE CONTROL:
OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
SETPOINTS (SUMMER): UNCONTROLLED
SETPOINTS (WINTER): MIN. 12ºC
+/- (ºC): UNCONTROLLED
OTHER/COMMENTS:

CONTROLS
CONTROLS TYPE: ALL DIGITAL
CONTROLS FRAMEWORK: BACNet OVER IP
OTHER / COMMENTS: - ROOM TEMP. MONITORING AND ALARM TO DISABLE BURNER RIG UPON HIGH SPACE TEMP. LOW TEMP LIMIT (0C). FUEL LEAK AND VAPOR MONITORING AND ALARM INTERLOCKED TO DISABLE FUEL TRANSFER PUMPS AND VENTILATION SYSTEM UPON ALARM. A SIMILAR INTERLOCK IS APPLICABLE TO THE FACILITY FIRE ALARM SYSTEM. EXISTING EMERGENCY SHUTDOWN PROCEDURE IS COMPLETED MANUALLY.

HUMIDITY
STATS: ZONE
SETPOINTS (SUMMER): UNCONTROLLED
SETPOINTS (SUMMER): UNCONTROLLED
+/- 5% RH
TRIM HUMIDIFICATION: NO

VENTILATION
AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
ROOM FILTRATION - EXHAUST: NONE
ROOM FILTRATION - SUPPLY: NONE
AIR CIRCULATION METHOD: 100% SUPPLY
SPECIALITY EXHAUST:
DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
DIRECTIONAL AIRFLOW METHOD: FORCED
PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
ROOM ISOLATION DAMPERS: YES
FILTRATION TYPE: N/A
PRESSURE AIRFLOW INDICATOR: NONE
EQ. EXHAUST: SILENCED COMBUSTION EXHAUST
MECHANICAL NOISE (DECIBELS / NC): NC50
OTHER / COMMENTS:
- DEDICATED VENT. SYSTEM INDEPENDENT OF BASE BUILDING SYSTEM (TBC)
- VARIABLE INTAKE AIR LOUVRE/DAMPER
- VARIABLE ROOME XHAUST 6,000-10,000 CFM

MONITORING AND ALARMS
PRESSURE / AIRFLOW INDICATOR: NO
EQUIPMENT MONITORING POINTS: NO
HVAC ALARM RELATIVE PRESSURIZATION: NO
ANIMAL ROOM MONITORING SYSTEM: NO
GAS DETECTION: NITROGEN GAS (N2) / COMBUSTIBLE GAS DETECTION SYSTEM
LIQUID / LEAK DETECTION: YES (LIQUID FUEL)
TEMP / HUMIDITY: YES

PROCESS PIPING
PROCESS WATER: YES
STEAM: NO
COMP. AIR: YES
BREATHING AIR: NO
ANIMAL WATER: NO
PURIFIED WATER: NO
NATURAL GAS: 1.5", 800 CFH @ 40 PSI (BACK UP TERMINATION AT ROOM)
HYDROGEN: PIPING BASED ON BTU EQUIVALENT TO JET FUEL APPROX. 3000 SCFH
COMMENTS:
- PROCESS WATER: 1/2" NON POTABLE WATER SERVICE TO LIQUID INJECTION SYSTEM (PIPE REMAINS DRY UNTIL REQUIRED, CONTROL VALVE IN BURNER CONTROL ROOM)
- COMP AIR: 2" 550 ACFM @ 100 PSIG FROM DEDICATED SYSTEM. INDEPENDENT UTILITY AIR IS REQUIRED.

GASES
SUPPLY SYSTEM TYPE: GAS CYLINDER SYSTEM
GAS TYPES: NITROGEN GAS (N2)

PLUMBING

FIXTURES
SINK TYPES: N/A
SINK DEPTH:
SINK COUNTS:
SINK DIMENSIONS:
INTEGRAL TO CASEWORK / BENCHTOP:
PEGBOARD:
FAUCET TYPE:
PIPING MATERIAL TYPE:
SIZE DIAMETER:
VENT SIZE DIAMETER:
SAFETY EMERGENCY SHOWER ANSI 358.1: NO
CORROSIVE MATERIAL: NO
SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
FLOOR DRAIN: SINGLE POINT
TRAP DEPTH: 75mm OR 100mm
MATERIAL: CARBON STEEL
HEPA FILTERED PLUMBING VENTS: NO
EFFLUENT DECONTAMINATION SYSTEM: NO
EFFLUENT pH CONTROL: NO
OTHER / COMMENTS: ROOM DRAINS TO OIL SEPARATOR
- FLOOR DRAIN REQUIREMENTS IN THE BURNER RIG ROOM TO CONFORM TO CSA B139.

FIRE PROTECTION / ALARM
HAZARD CLASS:
SPRINKLER SYSTEM: YES
SPRINKLER SYSTEM TYPE: (OTHER-DEFINE)
FIRE DETECTION: NORMAL (TO CODE)
ALARM METHOD: NORMAL
OTHER / COMMENTS:
- SPRINKELR SYSTEM TYPE TO UTILIZE INERT GAS FIRE SUPPRESSION SYSTEM

HAZARDS
BUILDING HAZARD CLASS (NBC / NSF):
HAZARD 1
CHEMICAL - JET FUEL, ALCOHOL, METHANOL, NATURAL GAS
NITROGEN
HAZARD 2
HAZARD 3

STRUCTURAL
STRUCTURAL DESIGN IMPLICATIONS:
ROLLING LOAD LIMITS:
VIBRATION CRITERA:
FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa
STRUCTURAL SHIELD REQUIREMENT:
CEILING LOADING:
SPECIAL PENETRATIONS:
OTHER / COMMENTS: Pressure relief panel in exterior wall

ELECTRICAL / POWER
CLASS TYPE: NORMAL
VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
VOLTAGE / CURRENT / PH 2:
SPECIAL NEMA PLUG ARRANGEMENT:
POWER DENSITY:
OVERHEAD SERVICE CARRIER: N/A
ISOLATED GROUNDING: N/A
GROUND FAULT PROTECTION: N/A
WEATHER PROOF COVER: N/A
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
TYPE IP RATING HERE:
RACEWAY: N/A
PLUG SPACING:
FLOOR BOX W TRENCH: NO
OTHER / COMMENTS:
EXPLOSION PROOF DEVICES AND FITTINGS

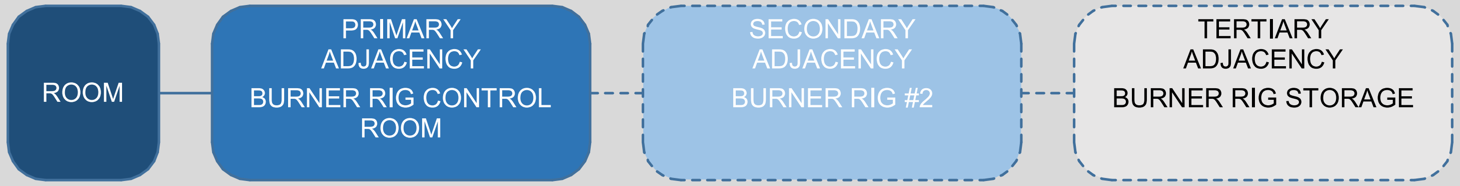
LIGHTING
SPECIALIZED LIGHTING: YES
SPECIALIZED CONTROL: NO
MOUNT: RECESSED CEILING
FIXTURE OUTPUT: DIRECT
LIGHT LEVEL (LUX):
LIGHT COLOUR TEMP (KELVIN): 4000
DIMMING SYSTEM: NO
WHITE TUNING:
TASK LIGHTING: NO
SCENE/ZONE CONTROL: NO
OCCUPANCY SENSORS: NO
NIGHT LIGHT: NO
DAYLIGHT CONTROL: NO
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
SAFETY LIGHTS:
A/V EQUIPMENT INTERFACE:
OTHER / COMMENTS:
EXPLOSION PROOF LIGHTING
LIGHTING CONTROLLED FROM CONTROL ROOM

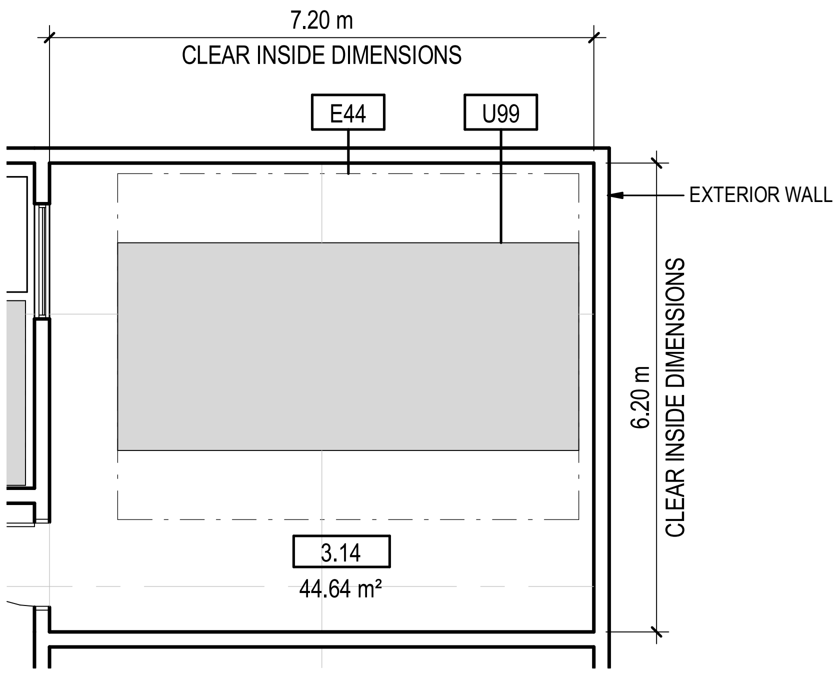
COMMUNICATIONS
PHONE: N/A
CELLULAR COMMUNICATION:
PUBLIC PAGING:N/A
INTERCOM:
DATA TYPE / POINTS: N/A
DATA PLUG SPACING:
WIRELESS: NO
CABLE TRAY TYPE:
OTHER / COMMENTS:
SPECIAL EQUIPMENT CONNECTIONS

SECURITY
CONNECTION TO CENTRAL MONITORING STATION:
CCTV: SAFETY TYPE
EMERGENCY DISTRESS CALL:
FAIL-SAFE HARDWARE:
INTRUDER SYSTEM:
ACCESS CONTROL (OPTIONS BELOW)
-
-
-
-
SECURITY EQUIPMENT:
SECURITY ZONES:
OTHER / COMMENTS:
Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.14	RDS: 022-2
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:	SPACE NAME: BURNER RIG #1
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM		

REQUIRED ADJACENCIES:





1 022-2 **3.14 - BURNER RIG #1**

1 : 100

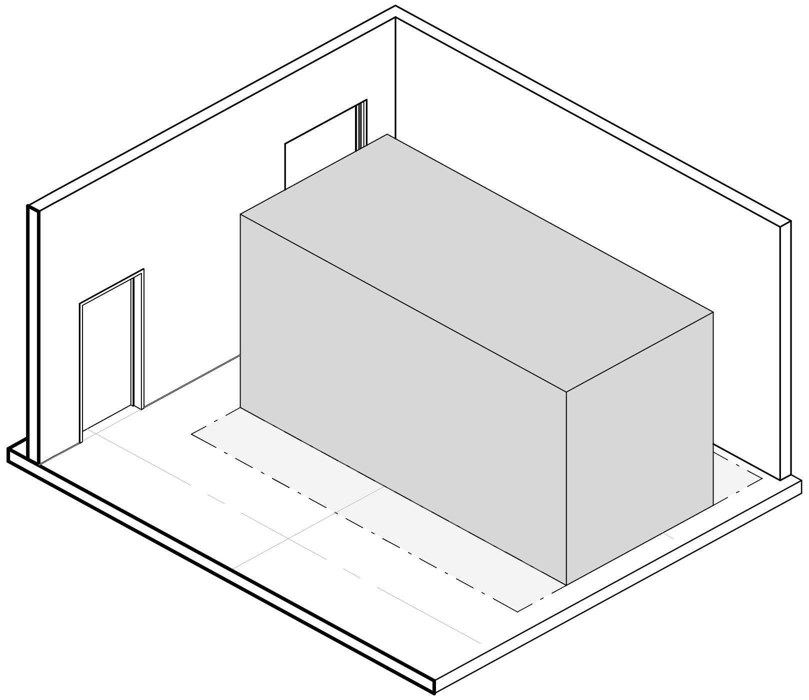
LEGEND

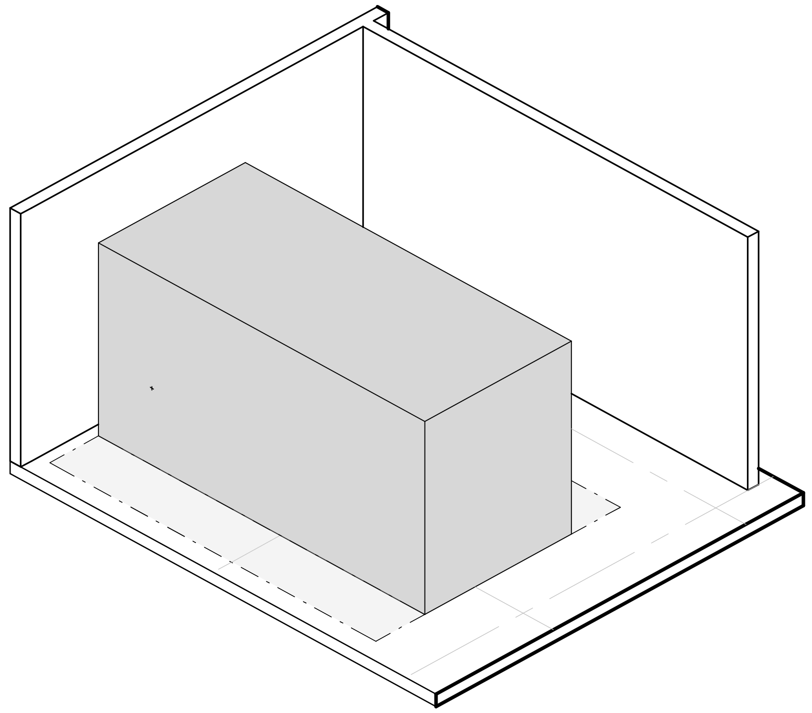
ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
		U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E44	COMBUSTOR SYSTEM		

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.14	RDS: 022-3
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY		SPACE NAME: BURNER RIG #1
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: BURNER RIG CONTROL ROOM — SECONDARY ADJACENCY: BURNER RIG #2 — TERTIARY ADJACENCY: BURNER RIG STORAGE		





REVISION # & ISSUE DATE: REV 6, 20/05/2021	**DEPARTMENTS / GROUP NAME: NRC**	**SPACE TYPE: LABORATORY**	**SPACE ID#: 3.15**	**RDS-023-1**
CHIEF SCIENTIST: Rick Kearsey	**CONTAINMENT RISK LEVEL: CL2**		**AREA (m2): 44.64**	**Space Name:**
CMO REP: Ann Marie Sibbald	**LAB CERTIFICATION REQUIREMENTS:**	**OPERATING HOURS: 8AM-5PM**	**SPECIE USE: N/A**	**BURNER RIG #2**
LC REP: Sophie Harvey	**ROOM FUNCTION AND ACTIVITES:**	**Containment/Combustion Laboratory & Fuel burning. Requires pre-action sprinkler system, fireproofing, HV exhaust & Supply, acoustical treatment, open area for equipment layout and storage cabinets, mid-bay height, and controllable daylight.**		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE:
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPRACT RESISTANT: YES
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: 4m
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: REQUIRED
- WINDOWS: YES
- OPERABLE: YES
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL: YES
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: SINGLE
- PRIMARY LEAF: 1100 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL: PRIMARY LEAF
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): UNCONTROLLED
- SETPOINTS (WINTER): MIN. 12ºC
- +/- (ºC): UNCONTROLLED
- OTHER/COMMENTS:

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS: - ROOM TEMP. MONITORING AND ALARM TO DISABLE BURNER RIG UPON HIGH SPACE TEMP. LOW TEMP LIMIT (0C). FUEL LEAK AND VAPOR MONITORING AND ALARM INTERLOCKED TO DISABLE FUEL TRANSFER PUMPS AND VENTILATION SYSTEM UPON ALARM. A SIMILAR INTERLOCK IS APPLICABLE TO THE FACILITY FIRE ALARM SYSTEM. EXISTING EMERGENCY SHUTDOWN PROCEDURE IS COMPLETED MANUALLY.

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): UNCONTROLLED
- SETPOINTS (SUMMER): UNCONTROLLED
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST:
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: YES
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: SILENCED COMBUSTION EXHAUST
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:
- - DEDICATED VENT. SYSTEM INDEPENDENT OF BASE BUILDING SYSTEM (TBC)
- - VARIABLE INTAKE AIR LOUVRE/DAMPER
- - VARIABLE ROOME XHAUST 6,000-10,000 CFM

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NITROGEN GAS (N2) / COMBUSTIBLE GAS DETECTION SYSTEM
- LIQUID / LEAK DETECTION: YES (LIQUID FUEL)
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: YES
- STEAM: NO
- COMP. AIR: YES
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- NATURAL GAS: 1.5", 800 CFH @ 40 PSI (BACK UP TERMINATION AT ROOM)
- HYDROGEN: PIPING BASED ON BTU EQUIVALENT TO JET FUEL APPROX. 3000 SCFH
- COMMENTS:
- - PROCESS WATER: 1/2" NON POTABLE WATER SERVICE TO LIQUID INJECTION SYSTEM (PIPE REMAINS DRY UNTIL REQUIRED, CONTROL VALVE IN BURNER CONTROL ROOM)
- - COMP AIR: 2" 550 ACFM @ 100 PSIG FROM DEDICATED SYSTEM. INDEPENDENT UTILITY AIR IS REQUIRED.

GASES
- SUPPLY SYSTEM TYPE: GAS CYLINDER SYSTEM
- GAS TYPES: NITROGEN GAS (N2)

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: SINGLE POINT
- TRAP DEPTH: 75mm OR 100mm
- MATERIAL: CARBON STEEL
- HEPA FILTERED PLUMBING VENTS: NO
- EFFLUENT DECONTAMINATION SYSTEM: NO
- EFFLUENT pH CONTROL: NO
- OTHER / COMMENTS: ROOM DRAINS TO OIL SEPARATOR
- - FLOOR DRAIN REQUIREMENTS IN THE BURNER RIG ROOM TO CONFORM TO CSA B139.

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: (OTHER-DEFINE)
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:
- - SPRINKELR SYSTEM TYPE TO UTILIZE INERT GAS FIRE SUPPRESSION SYSTEM

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):

HAZARD 1
- CHEMICAL - JET FUEL, ALCOHOL, METHANOL, NATURAL GAS
- NITROGEN

HAZARD 2

HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: Pressure relief panel in exterior wall

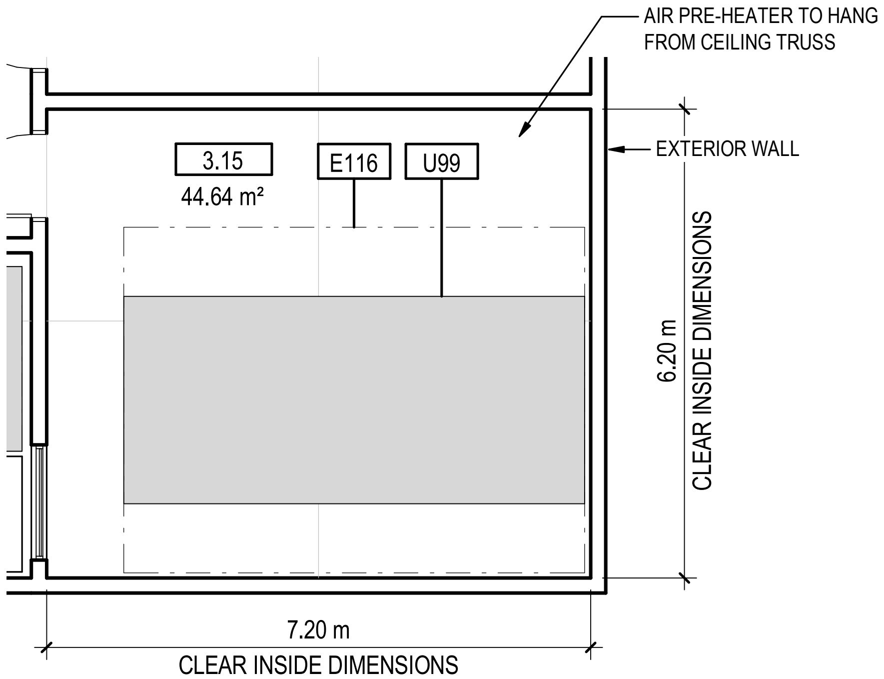
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2: 480V / XXX / 3 PH
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- EXPLOSION PROOF DEVICES AND FITTINGS

LIGHTING
- SPECIALIZED LIGHTING: YES
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: INDIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: NO
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS:
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:
- EXPLOSION PROOF LIGHTING
- LIGHTING CONTROLLED FROM CONTROL ROOM

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS:
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:
- SPECIAL EQUIPMENT CONNECTIONS

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV: SAFETY TYPE
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.15	RDS: 023-2
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY		SPACE NAME: BURNER RIG #2
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: BURNER RIG CONTROL ROOM — SECONDARY ADJACENCY: BURNER RIG #1 — TERTIARY ADJACENCY: BURNER RIG STORAGE		



1 / 023-2 **3.15 - BURNER RIG #2**

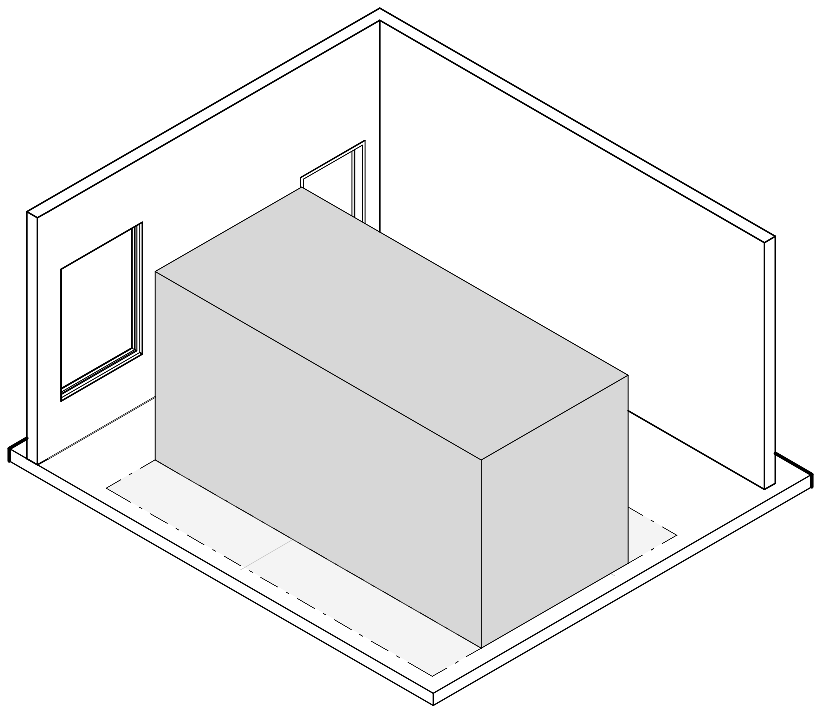
1 : 100

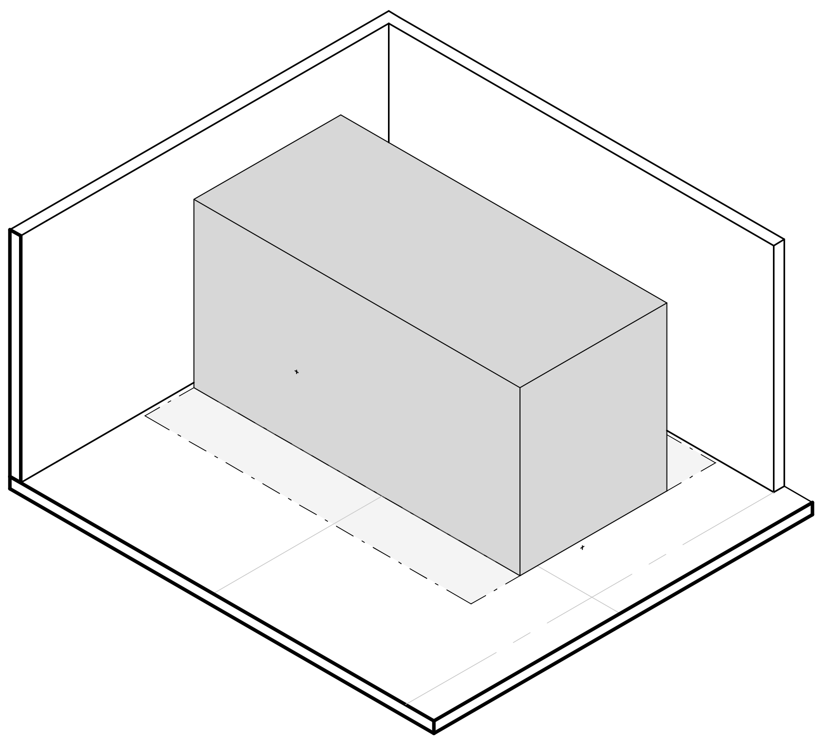
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
		U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT			
E116	COMBUSTER SYSTEM		

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.15	**RDS: 023-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:	**SPACE NAME: BURNER RIG #2**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: BURNER RIG CONTROL ROOM — SECONDARY ADJACENCY: BURNER RIG #1 — TERTIARY ADJACENCY: BURNER RIG STORAGE		





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	SPACE ID#: 3.16	**RDS-024-1**
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 38.88	**Space Name:**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	**FULL SCALE TESTING PREP ROOM**
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Open space for laying out large tables/work surface for sample preparation assembly required. Mid-height volume is preferable with immediate access to the NRC high bay. A dedicated equipment storage area is also required (refer to 4.6 - Full Scale Testing Equipment Storage).		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE:
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: (OTHER-DEFINE)
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS: 7m HEIGHT TO U/S OF STRUCTURE

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: YES
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: STAINLESS STEEL
- OTHER / COMMENTS: MOBILE ADJUSTABLE HEIGHT WORKBENCH
- WOOD BENCHTOP PREFERRED
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS: NO
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: SINGLE
- PRIMARY LEAF: 1100 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE: OVERHEAD DOOR
- PRIMARY LEAF: 3000 mm x 4200 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK W/ MANUAL OVERRIDE

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:
- - EXHAUST EXTRATION ARM FOR COLLECTING FUMES AND DUST FOR PAINT STRIPPING AND GRIT BLASTING ACTIVITIES.

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: YES
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD: NO
- FAUCET TYPE: N/A
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL:
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- **HAZARD 1**
- CHEMICAL, SMALL AMOUNTS
- **HAZARD 2**
- **HAZARD 3**

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: 1.0 t overhead crane

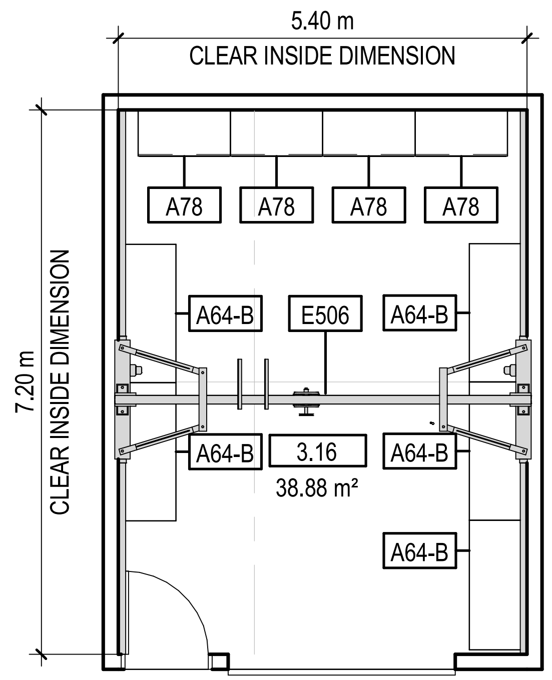
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2: 600V / XXX / 3PH
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY:
- PLUG SPACING: 600mm
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- 20A RECEPTACLES ABOVE WORKBENCH

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE:
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.16		**RDS: 024-2**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY			**SPACE NAME: FULL SCALE TESTING PREP ROOM**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: NRC HIGH BAY — SECONDARY ADJACENCY: FULL SCALE TESTING EQUIPMENT STORAGE — TERTIARY ADJACENCY			



1
024-2
3.16 - FULL SCALE TESTING PREP ROOM
1 : 100

LEGEND

ARCHITECTURAL SYSTEMS

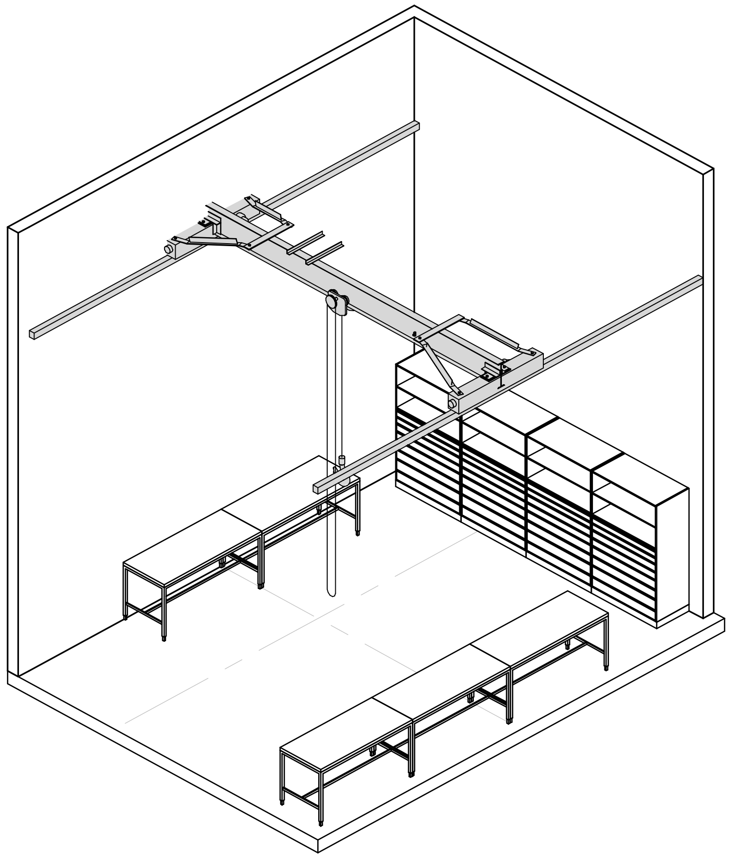
A64-B	WORKBENCH, HEAVY DUTY
A78	STORAGE UNIT, 8 DRAWER

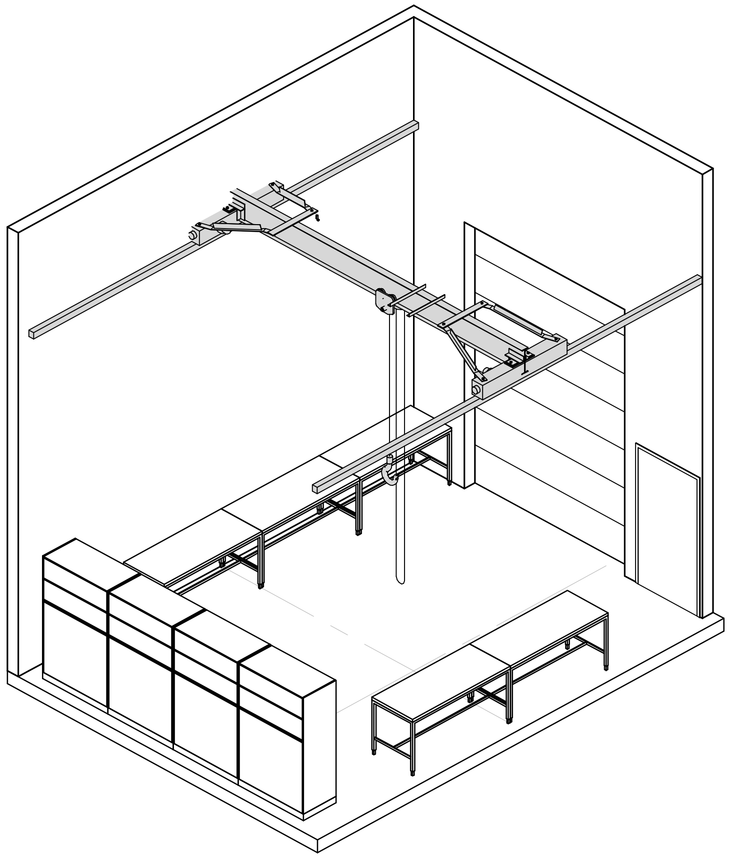
UTILITIES / SYSTEMS

SPECIALTY EQUIPMENT

E506	1t OVERHEAD CRANE

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.16	**RDS: 024-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY		**SPACE NAME: FULL SCALE TESTING PREP ROOM**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:			





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	SPACE ID#: 3.17	RDS-025-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 109.44	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	HEAT TREATMENT AND COATING LAB
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Part of Heat Treatment and Research Laboratories. Room must accommodate high heat loads. Requires ventilation hoods, glove box, counter/benching area for equipment layout, open space for equipment layout, work surfaces, mid-bay height and controllable daylight.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE:
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: 4m
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: 900mm
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: YES
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: STAINLESS STEEL
- OTHER / COMMENTS: MOBILE ADJUSTABLE HEIGHT WORKBENCH
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: REQUIRED
- WINDOWS: YES
- OPERABLE: YES
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL: YES
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- % RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: CANOPY HOOD EXHAUST
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC45
- OTHER / COMMENTS:
- - CANOPY HOOD EXHAUST OVER FURNACE EQUIPMENT
- - HOOD EXHAUST OVER FURNACES TO CAPTURE SOURCE HEAT

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A
- - INTER GAS CYLINDERS FROM GAS STORAGE ROOM.

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL:
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- **HAZARD 1**
- **HAZARD 2**
- **HAZARD 3**

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

ELECTRICAL / POWER

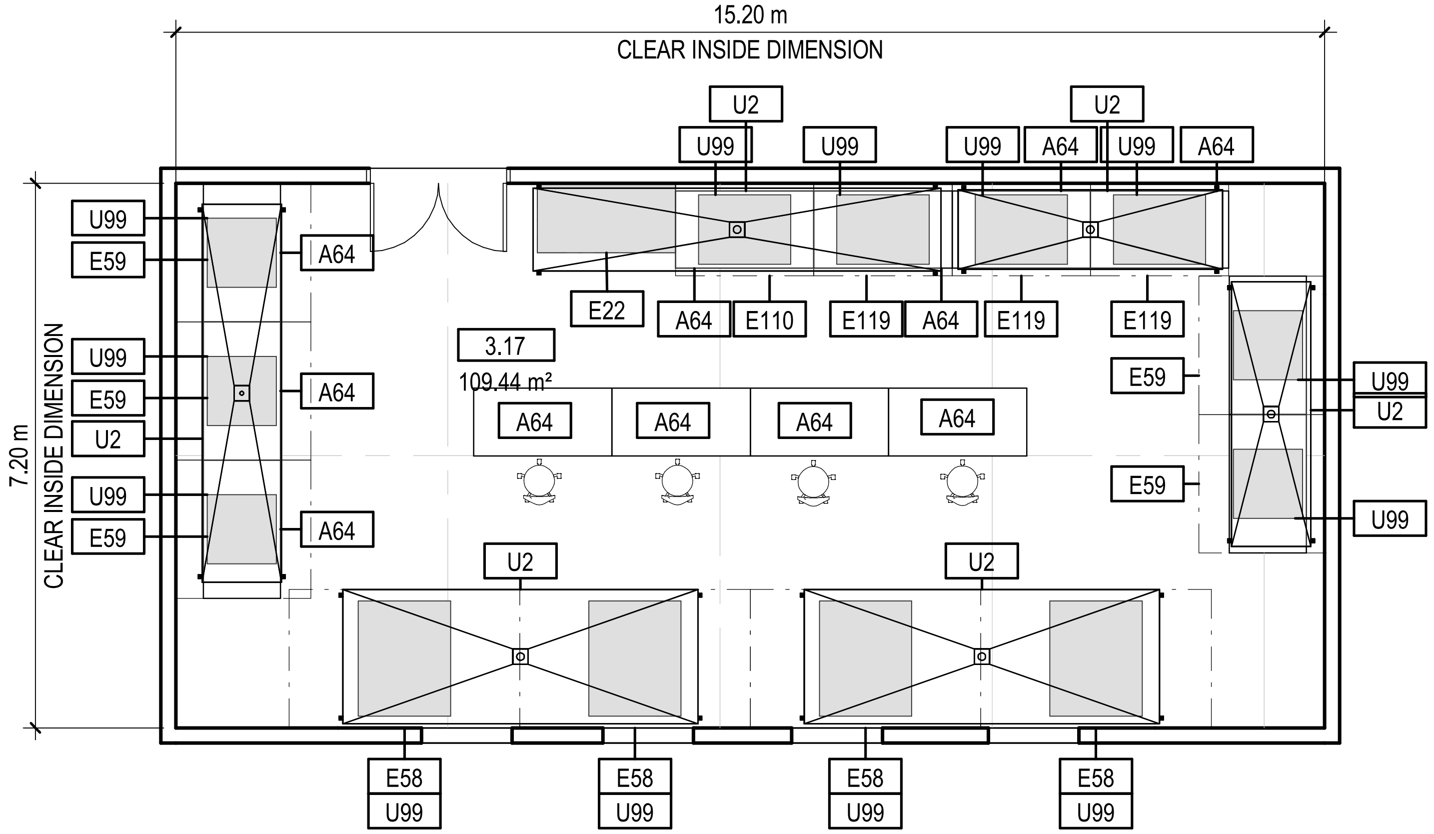
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PHASE
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER:
- ISOLATED GROUNDING:
- GROUND FAULT PROTECTION:
- WEATHER PROOF:
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: YES
- OTHER / COMMENTS:
- MULTIPLE HARD WIRED CONNECTIONS TO EQUIPMENT
- POWER FROM BELOW TO WORKBENCHES IN MIDDLE OF ROOM

LIGHTING
- SPECIALIZED LIGHTING: YES
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: YES
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.17	**RDS: 025-2**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY		**SPACE NAME: HEAT TREATMENT AND COATING LAB**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: HTM R&D LAB — SECONDARY ADJACENCY: HOT ISO-STATIC PRESS — TERTIARY ADJACENCY		



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025-2

3.17 - HEAT TREATMENT AND COATING LAB

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LEGEND

ARCHITECTURAL SYSTEMS

A64	WORKBENCH, MOBILE

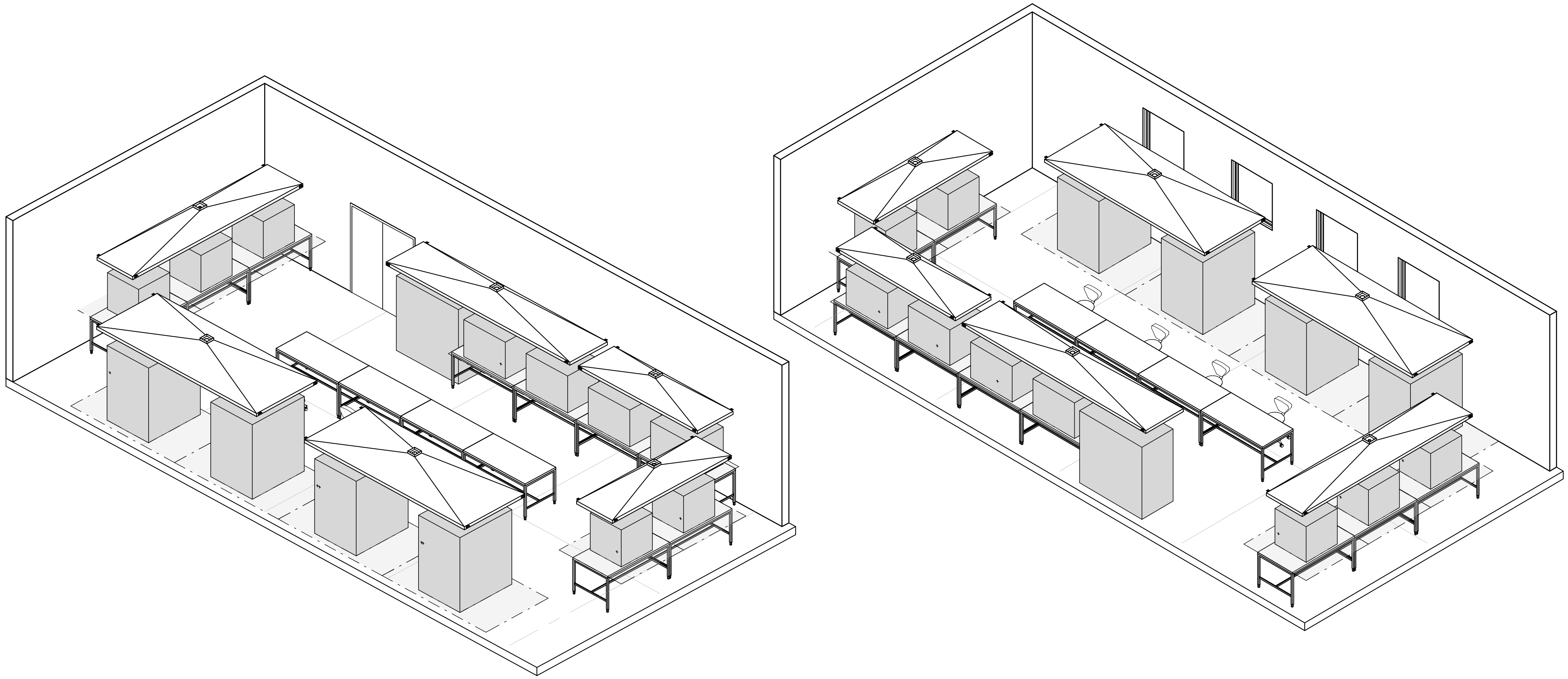
UTILITIES / SYSTEMS

U2	CANOPY HOOD
U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E22	VERTICAL TUBE FURNACE - LINDBERG
E58	CYCLIC OXIDATION FURNANCE RAPID TEMP
E59	HIGH TEMPERATURE BOX FURNACE
E110	LINDBURG FURNANCE
E119	HEAT TREATMENT FURNANCE - LINDBURG

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.17		**RDS: 025-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: HEAT TREATMENT AND COATING LAB**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY HTM R&D LAB — SECONDARY ADJACENCY HOT ISOSTATIC PRESS — TERTIARY ADJACENCY			



REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	SPACE ID#: 3.18	RDS-026-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 25.92	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	FULL SCALE TESTING CONTROL ROOM
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Control room for NRC SMPL high bay laboratory. Requires direct and unobstructed view to high bay and area for workstations.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPRACT RESISTANT: YES
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS: METAL PANEL WALL SYSTEM FOR MODULAR CONTROL ROOM

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: YES
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: STAINLESS STEEL
- OTHER / COMMENTS: CLOSED STORAGE SHELVING, MOBILE ADJUSTABLE HEIGHT WORKBENCH
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: YES
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS: YES
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS: INTERIOR IMPACT RESISTANT GLAZING REQUIRED TO ALLOW VIEWS INTO HIGH-BAY LAB

DOORS/ HARDWARES
- DOOR TYPE: SINGLE
- PRIMARY LEAF: 1100 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS
ONE CONTROL ROOM PLACE AS HIGH AS PERMISSABLE TO ALLOW OVERWATCH OF 1.1 NRC HIGH BAY (2ND/3RD/4TH STORY).
ONE AS PORTABLE MODULAR ROOM ON HIGH BAY FLOOR.

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK W/ MANUAL OVERRIDE

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC45
- OTHER / COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD: NO
- FAUCET TYPE: N/A
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL:
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

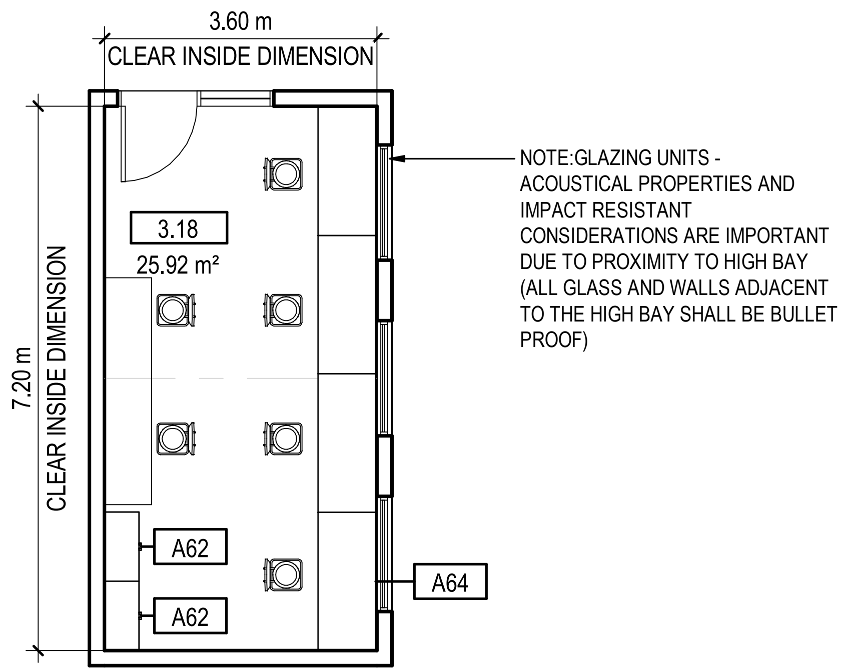
ELECTRICAL / POWER
- CLASS TYPE: NORMAL + UPS
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- CONDUIT CONNECTION PATHWAYS TO NRC HIGHBAY

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:
- LOUDSPEAKER INTO HIGH BAY

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- CARD
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.18	**RDS: 026-2**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY		**SPACE NAME: FULL SCALE TESTING CONTROL ROOM**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY NRC HIGH BAY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



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026-2

3.18 - FULL SCALE TESTING CONTROL ROOM

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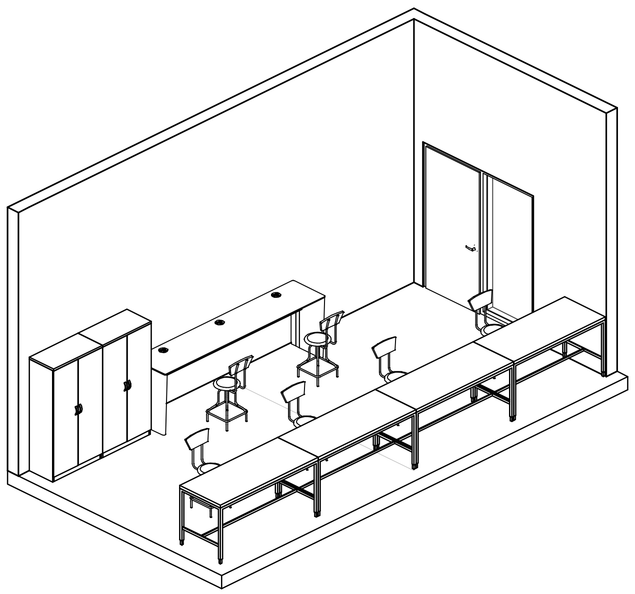
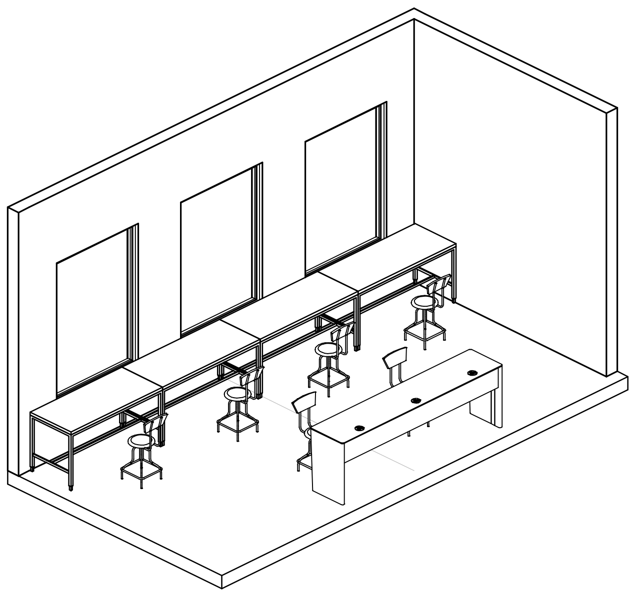
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A62	STORAGE SHELVING, TALL, CLOSED		
A64	WORKBENCH, MOBILE		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.18	**RDS: 026-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:	**SPACE NAME: FULL SCALE TESTING CONTROL ROOM**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: NRC HIGH BAY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY	SPACE ID#: 3.19A	RDS-027A-1
CHIEF SCIENTIST: Martin Breton & Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 26.42	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 7AM-5PM	SPECIE USE: N/A	SEM LAB - A
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Scanning Electron Microscrope (SEM) Lab. Requires: open space to locate SEM, servicing instruments 915mm circumfrence, space for workstations, space for viewing, separate lab support/service room, vacuum system venting, and air filtration. Equipment is sensistive to daylight and vibration.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: 5/8" GYP.
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING: YES
- PENETRATION SEALING:
- OTHER / COMMENTS:
- Accoustic considerations, vibration sensitive and magnetic field protection is required

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS: NO
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: SINGLE + HALF
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLICABLE): 600 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER / COMMENTS: - STABLE TEMPERATURE REQUIRED NOT EXCEEDING
- <1C/Hr RATE OF CHANGE

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 1% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: LOCAL MERV (EFF. TBC BY TSTS)
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: MERV 11 (TBC)
- PRESSURE AIRFLOW INDICATOR
- EQ. EXHAUST: E12/E78 SEM, EXHAUST TO EXTERIOR
- MECHANICAL NOISE (DECIBELS / NC): NC45
- OTHER / COMMENTS:
- LOW MIN. AC/Hr RATE ACHIEVED THRU DEMAND CONTROL VENTILATION SYS.
- INERT GAS INJECTION SYSTEM EXHAUST TO OUTDOORS

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NITROGEN GAS (N2) DETECTION SYSTEM
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: YES
- STEAM: NO
- COMP. AIR: YES
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- PROCESS COOLING WATER: YES (DEDICATED TO SEM EQUIP)
- OTHER PROCESS FLUIDS:
- COMMENTS: - COMP. AIR REQUIRED FOR ANTI-VIBRATION TABLE WITH LOCAL
- OIL AND MOISTURE REMOVAL SYSTEM.

GASES
- SUPPLY SYSTEM TYPE: GAS CYLINDER SYSTEM
- GAS TYPES: NITROGEN GAS (N2)

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: SINGLE POINT
- TRAP DEPTH: 75mm OR 100mm
- MATERIAL: CARBON STEEL
- HEPA FILTERED PLUMBING VENTS: NO
- EFFLUENT DECONTAMINATION SYSTEM: NO
- EFFLUENT pH CONTROL: NO
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: DOUBLE INTERLOCK PRE-ACTION SYSTEM
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:
- - DEDICATED DOUBLE INTERLOCK PRE-ACTION SYSTEM PROVIDING
- ADDITIONAL MEASURE AGAINST ACCIDENTAL DISCHAGE OF WATER

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- **HAZARD 1**
- RADIATION
- **HAZARD 2**
- **HAZARD 3**

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA: SEM floor to be isolated from structure.
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: Review manufacturer requirements for isolation.

ELECTRICAL / POWER
- CLASS TYPE: NORMAL + UPS
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: YES
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- SPECIALTY EQUIPMENT CONNECTIONS
- WIREMOLD

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS:
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:

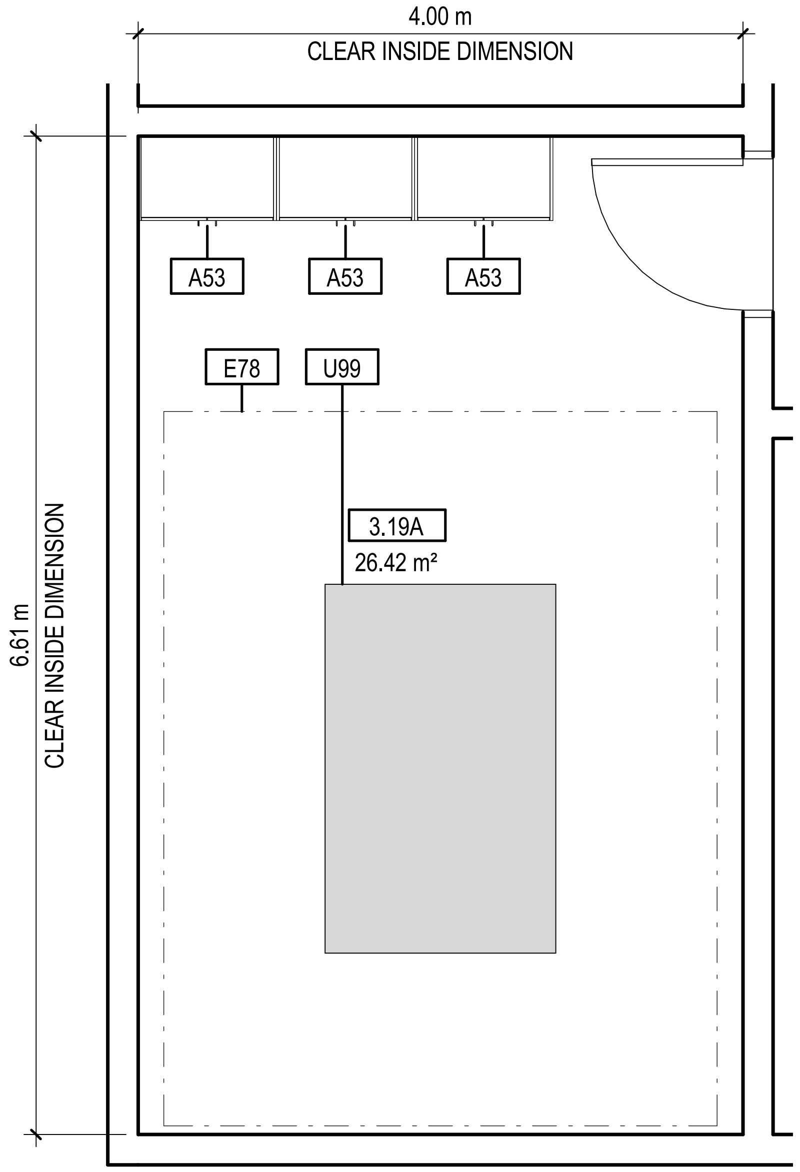
COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.19A	**RDS: 027A-2**
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LABORATORY		**SPACE NAME: SEM LAB - A**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:	

REQUIRED ADJACENCIES:

ROOM	PRIMARY ADJACENCY	SECONDARY ADJACENCY	TERTIARY ADJACENCY
ROOM	SEM LAB SUPPORT	SEM PREP ROOM	MICROSCOPE LAB



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3.19A - SEM LAB - A
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LEGEND

ARCHITECTURAL SYSTEMS

A53	CASEWORK, TALL STORAGE CABINET

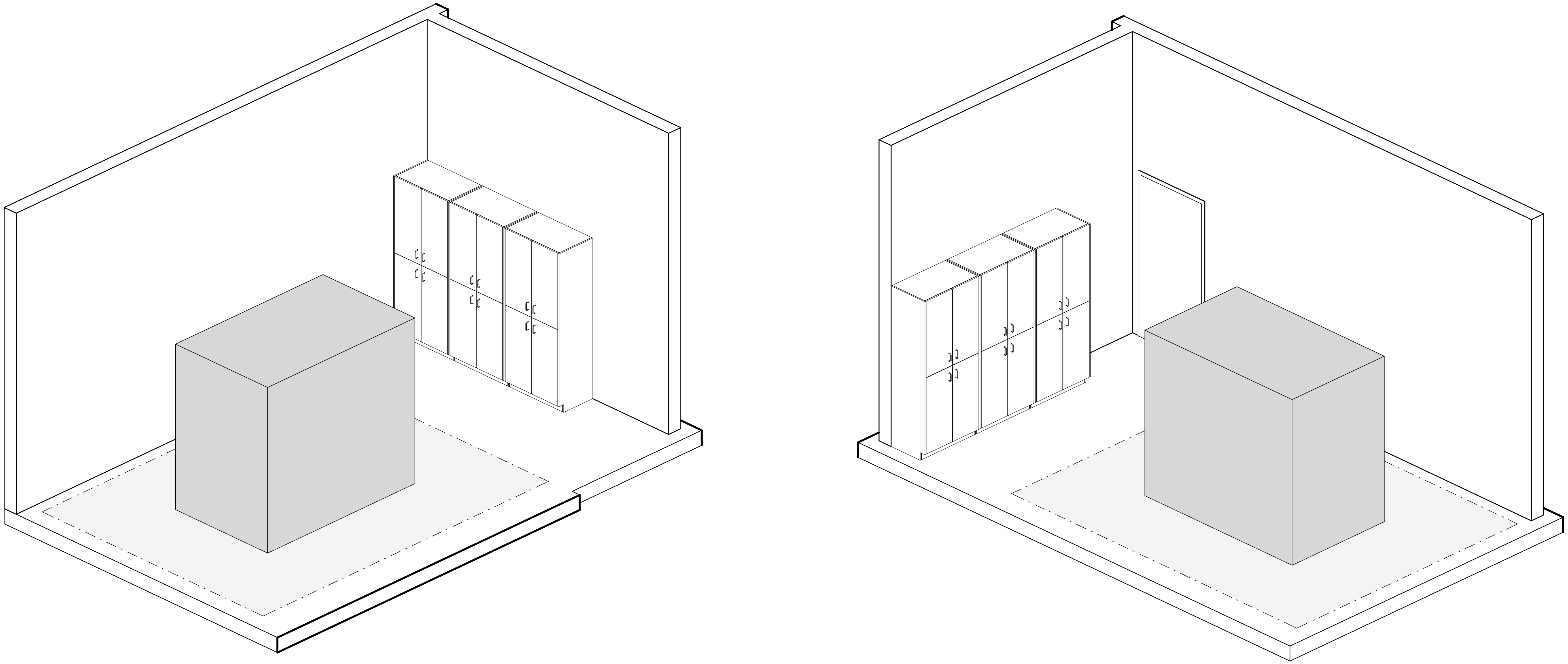
UTILITIES / SYSTEMS

U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E78	SCANNING ELECTRON MICROSCOPE

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.19	**RDS: 027A-3**
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LABORATORY		**SPACE NAME: SEM LAB - A**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: SEM LAB SUPPORT — SECONDARY ADJACENCY: SEM PREP ROOM — TERTIARY ADJACENCY: MICROSCOPE LAB		



REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY	SPACE ID#: 3.19	**RDS-027B-1**
CHIEF SCIENTIST: Martin Breton & Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 26.42	**Space Name:**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 7AM-5PM	SPECIE USE: N/A	**SEM LAB - B**
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Scanning Electron Microscrope (SEM) Lab. Requires: open space to locate SEM, servicing instruments 915mm circumfrence, space for workstations, space for viewing, separate lab support/service room, vacuum system venting, and air filtration. Equipment is sensistive to daylight and vibration.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: 5/8" GYP.
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING: YES
- PENETRATION SEALING:
- OTHER / COMMENTS:
- Accoustic considerations, vibration sensitive and magnetic field protection is required

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS: NO
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: SINGLE + HALF
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 600 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER / COMMENTS: - STABLE TEMPERATURE REQUIRED NOT EXCEEDING
- <1C/Hr RATE OF CHANGE

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 1% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: LOCAL MERV (EFF. TBC BY TSTS)
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: MERV 11 (TBC)
- PRESSURE AIRFLOW INDICATOR
- EQ. EXHAUST: E12/E78 SEM, EXHAUST TO EXTERIOR
- MECHANICAL NOISE (DECIBELS / NC): NC45
- OTHER / COMMENTS:
- LOW MIN. AC/Hr RATE ACHIEVED THRU DEMAND CONTROL VENTILATION SYS.
- INERT GAS INJECTION SYSTEM EXHAUST TO OUTDOORS

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NITROGEN GAS (N2) DETECTION SYSTEM
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: YES
- STEAM: NO
- COMP. AIR: YES
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- PROCESS COOLING WATER: YES (DEDICATED TO SEM EQUIP)
- OTHER PROCESS FLUIDS:
- COMMENTS: - COMP. AIR REQUIRED FOR ANTI-VIBRATION TABLE WITH LOCAL
- OIL AND MOISTURE REMOVAL SYSTEM.

GASES
- SUPPLY SYSTEM TYPE: GAS CYLINDER SYSTEM
- GAS TYPES: NITROGEN GAS (N2)

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: SINGLE POINT
- TRAP DEPTH: 75mm OR 100mm
- MATERIAL: CARBON STEEL
- HEPA FILTERED PLUMBING VENTS: NO
- EFFLUENT DECONTAMINATION SYSTEM: NO
- EFFLUENT pH CONTROL: NO
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: DOUBLE INTERLOCK PRE-ACTION SYSTEM
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:
- - DEDICATED DOUBLE INTERLOCK PRE-ACTION SYSTEM PROVIDING
- ADDITIONAL MEASURE AGAINST ACCIDENTAL DISCHAGE OF WATER

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):

HAZARD 1
- Compressed gases: nitrogen for SEM chamber ventilation. If new SEM will be purchsed with GIS (Gas Injection System): XeF2, used for ion beam etching.

HAZARD 2
- RADIATION

HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA: SEM floor to be isolated from structure.
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: Review manufacturer requirements for isolation.

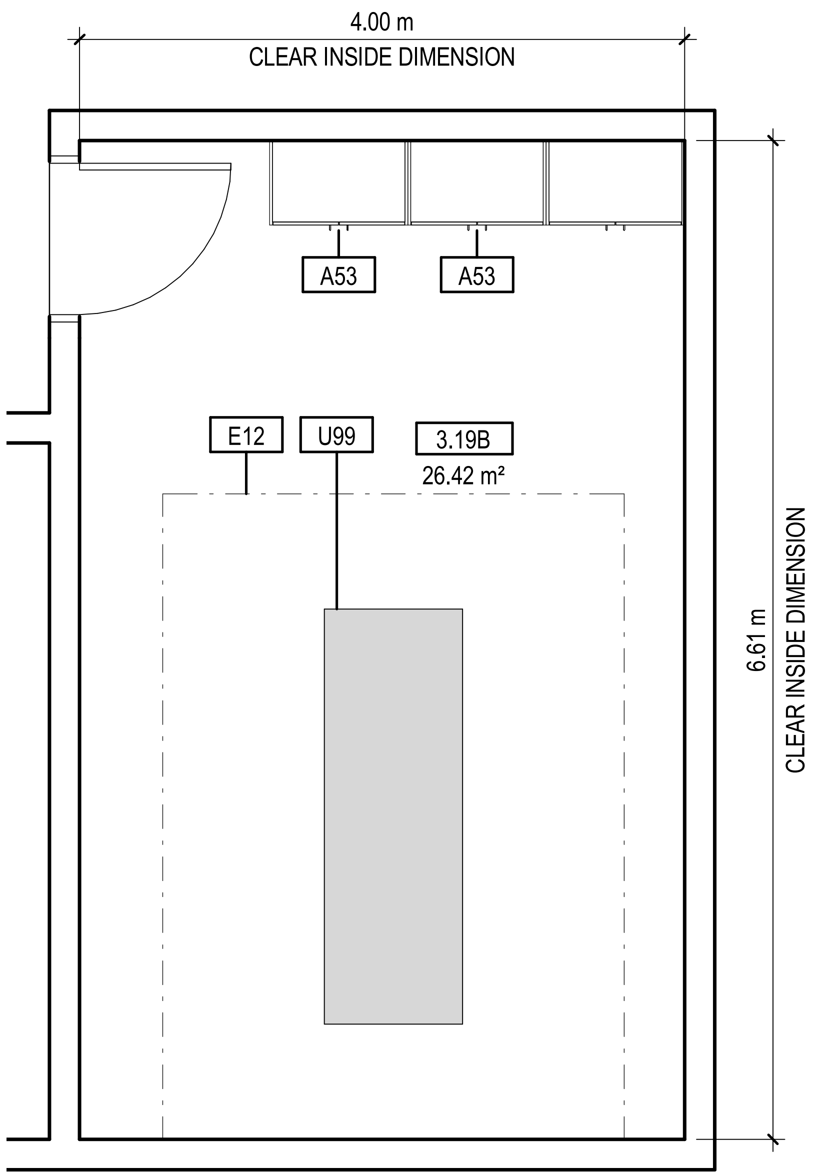
ELECTRICAL / POWER
- CLASS TYPE: NORMAL + UPS
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER:
- ISOLATED GROUNDING:
- GROUND FAULT PROTECTION:
- WEATHER PROOF:
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY:
- PLUG SPACING:
- FLOOR BOX W TRENCH:
- OTHER / COMMENTS:
- SPECIALTY EQUIPMENT CONNECTIONS

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS:
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.19B	RDS: 027B-2
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:	SPACE NAME: SEM LAB - B
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MICROSCOPE LAB — SECONDARY ADJACENCY: SEM LAB SUPPORT — TERTIARY ADJACENCY: SEM SERVICE STORAGE		



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3.19B - SEM LAB - B

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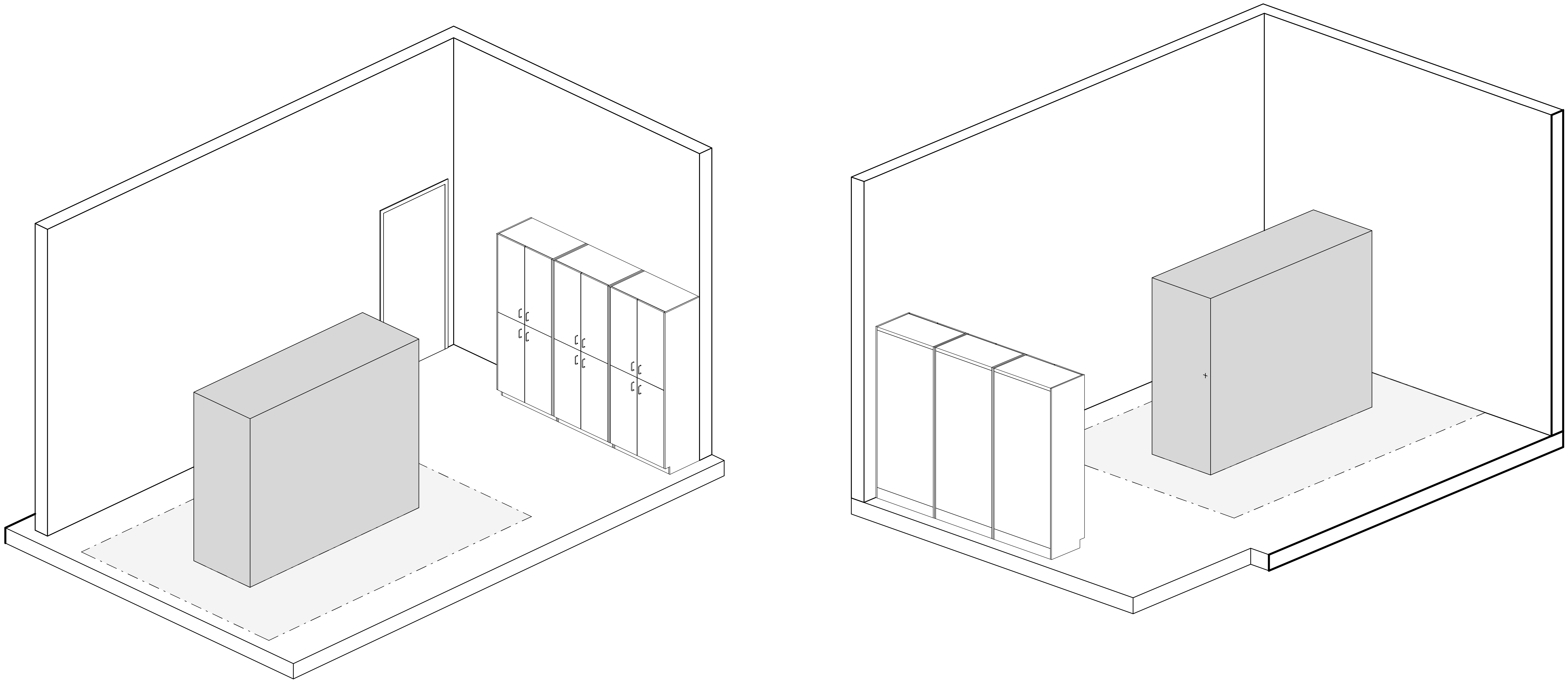
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A53	CASEWORK, TALL STORAGE CABINET	U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT			
E12	SCANNING ELECTRON MICROSCOPE PHILIPS		

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.19B	**RDS: 027B-3**
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LABORATORY		**SPACE NAME: SEM LAB - B**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MICROSCOPE LAB — SECONDARY ADJACENCY: SEM LAB SUPPORT — TERTIARY ADJACENCY: SEM SERVICE STORAGE		



REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY	SPACE ID#: 3.20	RDS-028-1
CHIEF SCIENTIST: Martin Breton & Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 113.40	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 7AM-5PM	SPECIE USE: N/A	MICROSCOPE LAB
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Requires: Lab benching environment, equipment such as microscopes will be positioned on top of benching, work surface area, clean room and dust control. Equipment is sensitive to daylight and vibration.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: 5/8" GYP.
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS: NO
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: SINGLE + HALF
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLICABLE): 600 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER / COMMENTS:

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: LOCAL MERV (EFF. TBC BY TSTS)
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: MERV 11
- PRESSURE AIRFLOW INDICATOR
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC45
- OTHER / COMMENTS:
- LOW MIN. AC/Hr RATE ACHIEVED THRU DEMAND CONTROL VENTILATION SYS.

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: YES
- STEAM: NO
- COMP. AIR: YES
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- PROCESS COOLING WATER: YES FOR FUTURE FLEXIBILITY
- OTHER PROCESS FLUIDS:
- COMMENTS:
- - PROCESS WATER: NON-POTABLE WATER TERMINATION ROUGH-IN FOR FUTURE FLEXIBILITY.
- - COMP. AIR: LAB AIR ROUGH-IN FOR FUTURE FLEXIBILITY

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES:
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD: YES
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO
- COMMENTS: - WATER IN ROOM IS NOT PREFERED BY FW PROPOSED TO ROUGH-IN PLUMBING SERVICES FOR FUTURE FLEXIBILITY

DRAINS / VENTS
- FLOOR DRAIN:
- TRAP DEPTH: 75mm OR 100mm
- MATERIAL: CARBON STEEL
- HEPA FILTERED PLUMBING VENTS: NO
- EFFLUENT DECONTAMINATION SYSTEM: NO
- EFFLUENT pH CONTROL: NO
- OTHER / COMMENTS:
- - DRAINAGE ROUGH-IN COMPLETE WITH AIR/LIQUID TIGHT CAP FOR FUTURE FLEXIBILITY

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

ELECTRICAL / POWER

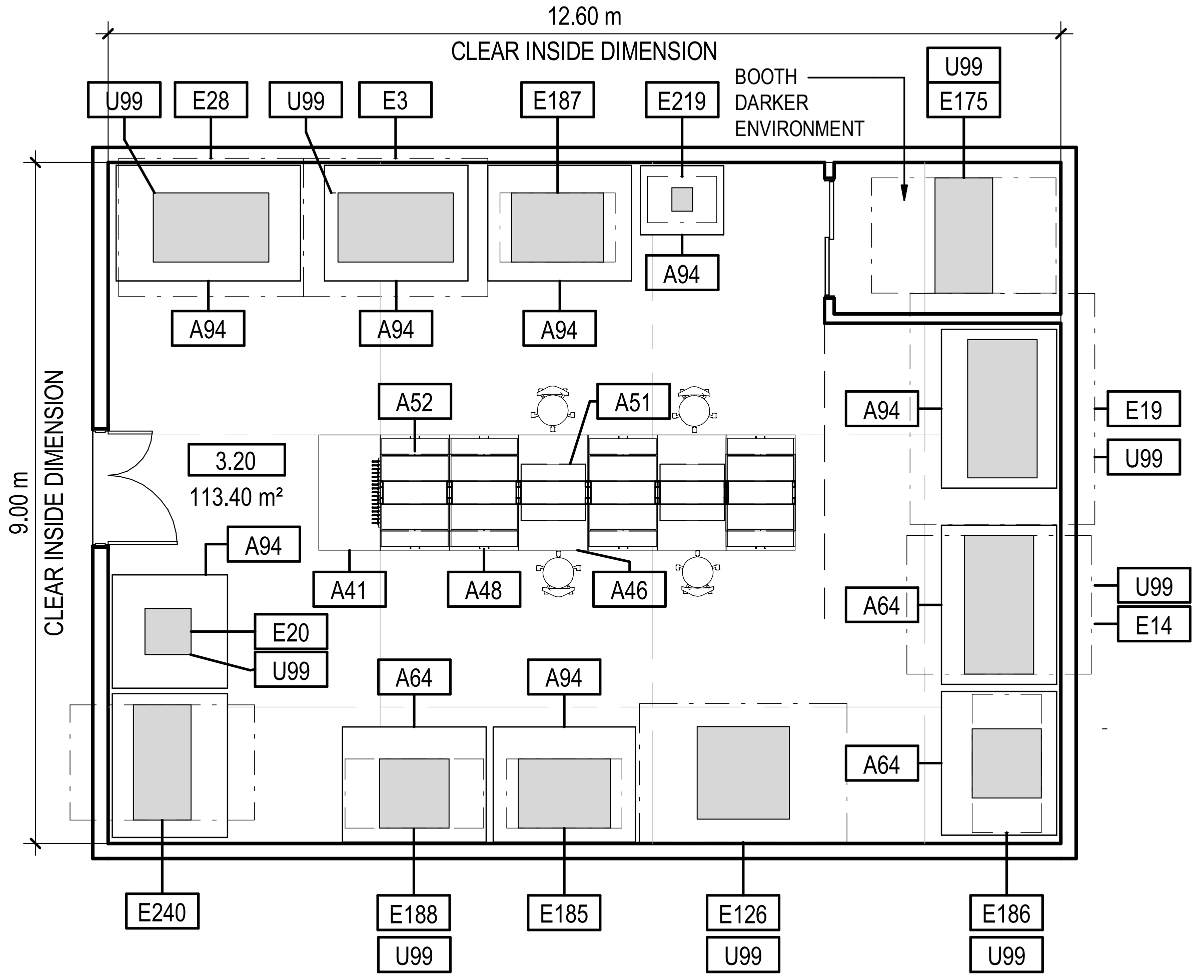
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: YES
- PLUG SPACING: 1m
- FLOOR BOX W TRENCH:
- OTHER / COMMENTS:
- WIREMOLD AROUND PERIMETER OF ROOM
- POWER/DATA FROM BELOW TO FEED MIDDLE WORKBENCHES

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:
- DIMMABLE, INDIVIDUALLY CONTROLLED TASK LIGHTS

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.20	RDS: 028-2
DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY		SPACE NAME: MICROSCOPE LAB
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY 3.21, 3.22 — TERTIARY ADJACENCY SEM LABS		



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3.20 - MICROSCOPE LAB

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LEGEND

ARCHITECTURAL SYSTEMS

A41	CASEWORK, COUNTE END, ISLAND
A46	CASEWORK, COUNTER
A48	CASEWORK, CLOSED LOWER CABINET
A51	CASEWORK, OPEN UPPER SHELVING
A52	CASEWORK, CLOSED UPPER SHELVING
A64	WORKBENCH, MOBILE
A94	VIBRATION SUPRESSION TABLE

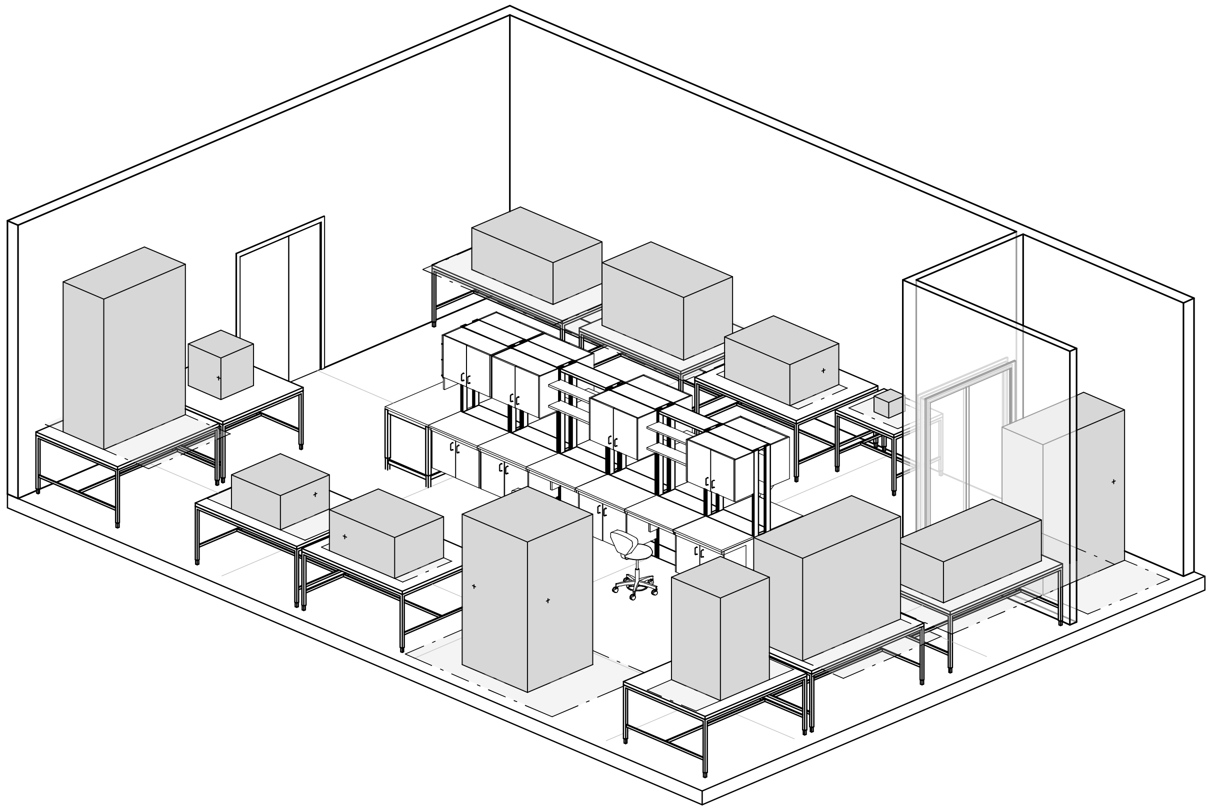
UTILITIES / SYSTEMS

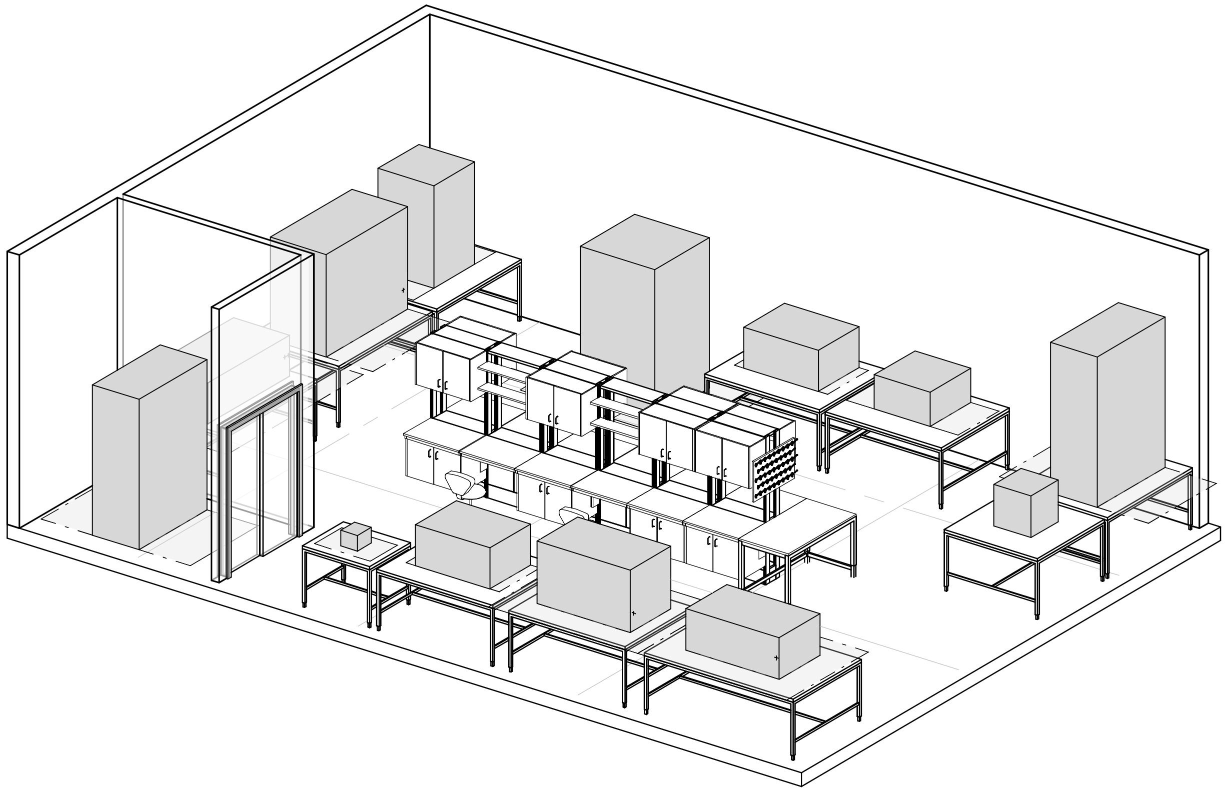
U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E3	OLYMPUS PMG3 - INVERTED MICROSCOPE
E14	TESTER,HARDNESS,INSTRON/ WILSON, ROCKWELL
E19	MICROHARDNESS TESTER PACKAGE
E20	MEASURING MICROSCOPE XY DIGITAL
E28	OLYMPUS GX71 INVERTED MICROSCOPE
E126	MICROSCOPE STEREOZOOM - OLYMPUS
E175	NIKON L-150A MICROSCOPE-INSPECTION
E185	WILD DISCUSSION MICROSCOPE
E186	CLARK HARDNESS TESTER
E187	LEICA METALLOGAPH MEF4M
E188	LEICA Z6APO MACROSCOPE
E219	HIGH PRESICION ELECTRONIC SCALES
E240	NIKON SMZ1000, C-PS160, SEREO MICROSCOPE

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.20	**RDS: 028-3**
DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:	**SPACE NAME: MICROSCOPE LAB**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY 3.21,3.22 — TERTIARY ADJACENCY SEM LABS		





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY	SPACE ID#: 3.21	**RDS-029-1**
CHIEF SCIENTIST: Martin Breton & Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 95.04	**Space Name: METALLOGRAPHIC SECTIONING SPECIMEN EXTRACTION**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 7AM-5PM	SPECIE USE: N/A	
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Sectioning and extraction of material samples for metallographic or fractographic analysis using specialized equipment. Requires: open space to accommodate lab benching modules and full height storage cabinets, lab benching environment, work surface area and lockable storage.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: 5/8" GYP.
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE: YES
- ACID: YES
- BASE: YES
- FLAMMABLE LIQUIDS: YES
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:
- (FLAMMABLE) CHAMICAL STORED IN INTEGRATED BASE CABINET UNDER FUMEHOOD

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: REQUIRED
- WINDOWS: YES
- OPERABLE: YES
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL: YES
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: SINGLE + HALF
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLICABLE): 600 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER / COMMENTS:

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK C/W LOCAL OCCUPANCY OVERRIDE

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR
- EQ. EXHAUST: FUMEHOOD
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:
- - LOCAL EXTRACTION ARM ADJACENT DRY-CUTTING SAW

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: YES
- STEAM: NO
- COMP. AIR: YES (OUTLETS AT PERIPHERY OF ROOM)
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:
- COMMENTS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A
- OTHER / COMMENTS:

PLUMBING

FIXTURES
- SINK TYPES: SS SINGLE BASIN
- SINK DEPTH:
- SINK COUNTS: 1
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP: YES
- PEGBOARD: YES
- FAUCET TYPE: MIXING, GOOSENECK, DECK MOUNTED
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
- COMMENTS:
- - HOSE BIBB CONNECTION REQUIRED

DRAINS / VENTS
- FLOOR DRAIN: SINGLE POINT
- TRAP DEPTH: 75mm OR 100mm
- MATERIAL: CARBON STEEL
- HEPA FILTERED PLUMBING VENTS: NO
- EFFLUENT DECONTAMINATION SYSTEM: NO
- EFFLUENT pH CONTROL: NO
- OTHER / COMMENTS:
- - SEDIMENT INTERCEPTOR AT SINK AND FUNNEL FLOOR DRAIN ADJACENT SAW
- - DRAIN REQUIRED FOR EQUIPMENT E-153

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- **HAZARD 1**
- CHEMICAL, SMALL AMOUNTS
- **HAZARD 2**
- **HAZARD 3**

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

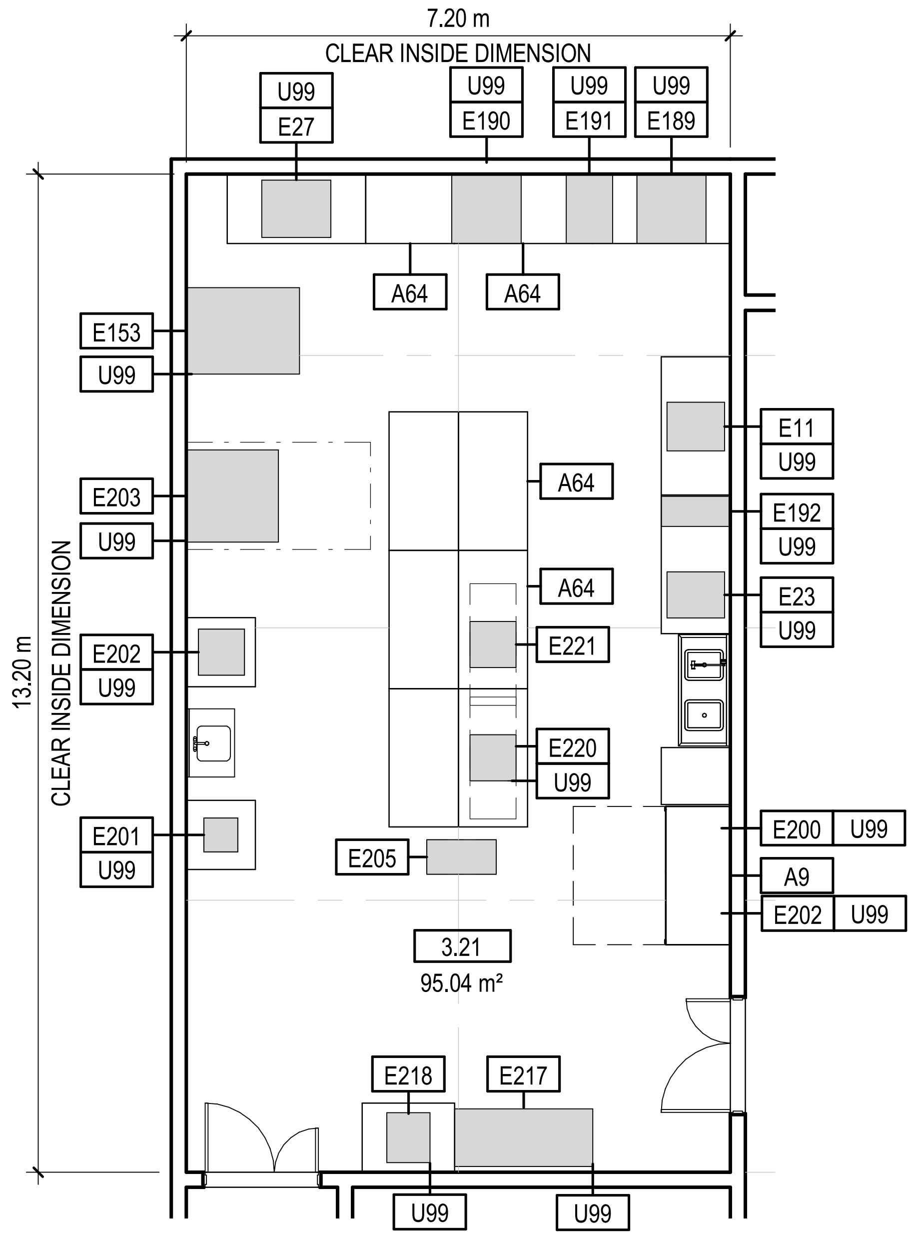
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: YES
- PLUG SPACING: 1m
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- POWER/COMMS FROM BELOW TO BENCHES IN MIDDLE
- SOME EQUIPMENT REQUIRES 240V CONNECTIONS

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: YES
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: N/A
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.21	RDS: 029-2
DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY		SPACE NAME: METALLOGRAPHIC SECTIONING AND SPECIMEN EXTRACTION
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: METALLOGRAPHIC SAMPLE PREPARATION — SECONDARY ADJACENCY: MICROSCOPE LAB, CHEMICAL LAB — TERTIARY ADJACENCY: TSB HIGH BAY		



3.21 - METALLOGRAPHIC SECTIONING AND SPECIMEN EXTRACTION

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LEGEND

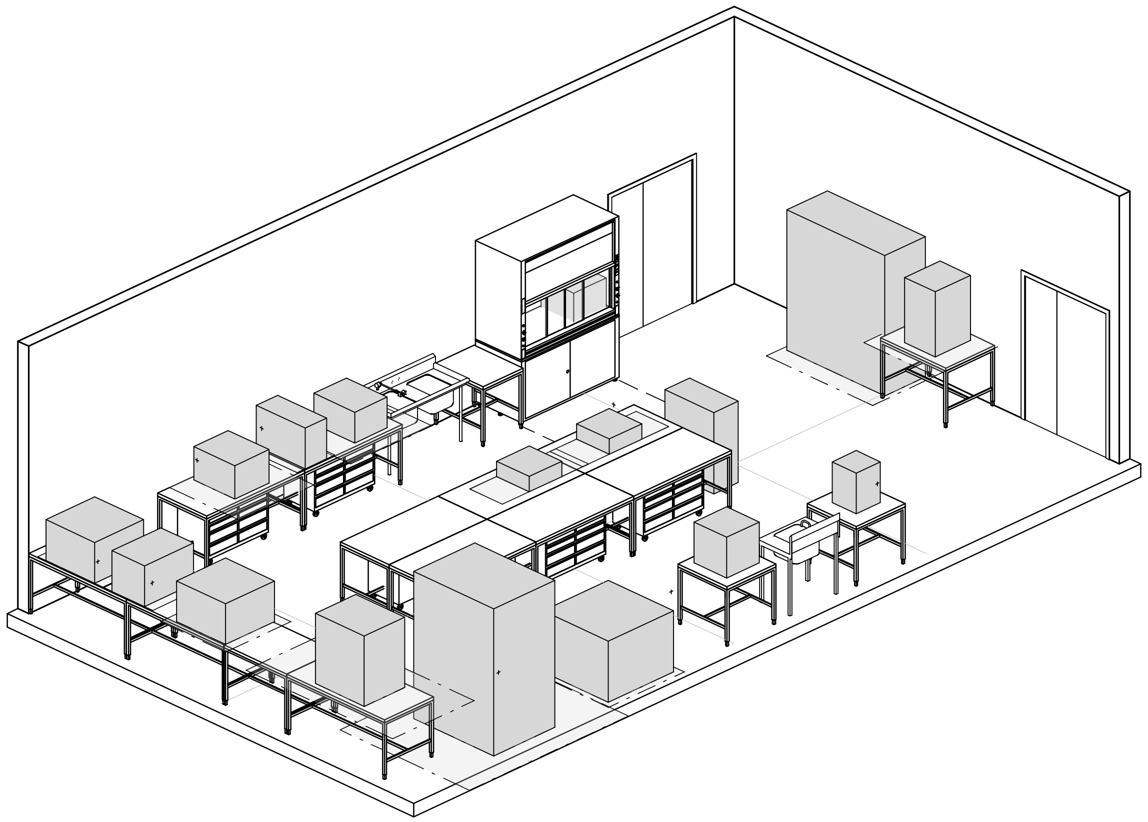
ARCHITECTURAL SYSTEMS / UTILITIES / SYSTEMS

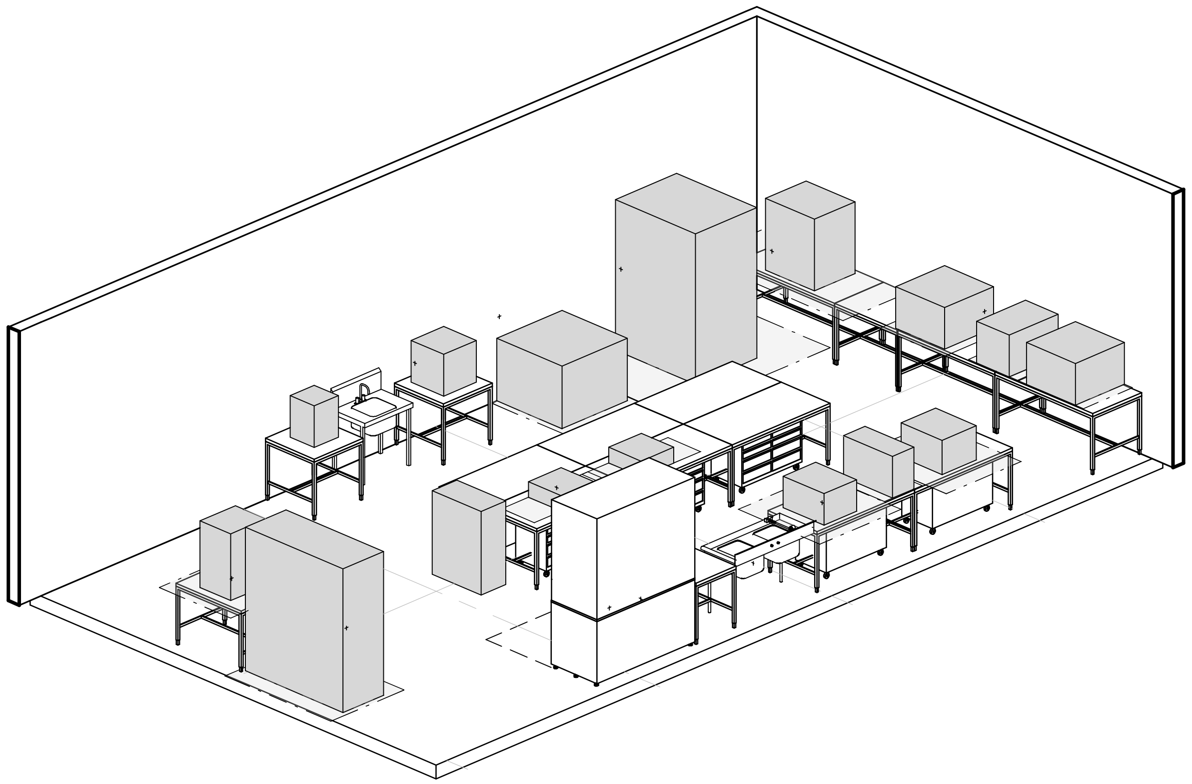
A9	FUMEHOOD (GENERAL PURPOSE), 6'	U30	HOT & COLD WATER, LAB
A38	MOBILE STORAGE CABINET, DRAWERS	U38	EYEWASH
A64	WORKBENCH, MOBILE	U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E11	SAW,PRECISION,ISOMET 2000
E23	PRECISION CUT OFF SECOTOM
E27	ABRAISIMATIC-300, BENCH TOP ABRASIVE CUTTER
E153	CUT OFF MACHINE - AXIOTOM
E189	GRINDING & POLISHING SYSTEMS - BUEHLER
E190	CUT OFF SAW - STRUERS DISCOTOM 5
E191	HIGH SPEED SAW - STRUERS ISOMET 4000
E192	CUTTING SAW - BUEHLER ISOMET 1000
E200	X-SMALL ULTRASONIC CLEANER
E201	SMALL ULTRASONIC CLEANER
E202	MEDIUM ULTRASONIC CLEANER
E203	PARTS CLEANER-DISHWASHER
E205	TOOL BOX
E217	EROSION TEST RIG
E218	DUST COLLECTOR
E220	PRESICION ELECTRONIC SCALES
E221	PRESICION ELECTRONIC SCALES

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.21		**RDS: 029-3**
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: METALLOGRAPHIC SECTIONING AND SPECIMEN EXTRACTION**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: METALLOGRAPHIC SAMPLE PREPARATION — SECONDARY ADJACENCY: MICROSCOPE LAB, CHEMICAL LAB — TERTIARY ADJACENCY: TSB HIGH BAY			





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY	SPACE ID#: 3.22	**RDS-030-1**
CHIEF SCIENTIST: Martin Breton & Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 109.44 + 5.60 + 5.60 = 120.64	**Space Name: METALLOGRAPHIC SAMPLE PREPARATION**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 7AM-5PM	SPECIE USE: N/A	
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Requires lab benching environment, work surface area, clean metallography room and abilities to handle chemical fumes.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: 5/8" GYP.
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE: YES
- ACID: YES
- BASE: YES
- FLAMMABLE LIQUIDS: YES
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:
- EXPOSION PROOF REFRIGERATOR
- FLAMMABLE CABINET TO BE SEALED, NOT VENTED

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: REQUIRED
- WINDOWS: YES
- OPERABLE: YES
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL: YES
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: SINGLE + HALF
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 600 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER / COMMENTS:

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: FUME HOOD EXHAUST
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR
- EQ. EXHAUST: FUMEHOOD
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: YES
- STEAM: NO
- COMP. AIR: YES
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: YES
- PROCESS COOLING: YES
- OTHER PROCESS FLUIDS:
- COMMENTS: - ROUGH-INS FOR COMP. AIR AND PROCESS WATER AT ISLAND WORKBENCH FOR FUTURE FLEXIBILITY
- - WATER PURIFIER / DISTILLATION UNIT TO SUPPLY PURIFIED WATER IN FUMEHOOD

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: SS SINGLE BASIN
- SINK DEPTH:
- SINK COUNTS: 2
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP: YES
- PEGBOARD: YES
- FAUCET TYPE: MIXING, GOOSENECK, DECK MOUNTED
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: YES
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES

DRAINS / VENTS
- FLOOR DRAIN: SINGLE POINT
- TRAP DEPTH: 75mm OR 100mm
- MATERIAL: CARBON STEEL
- HEPA FILTERED PLUMBING VENTS: NO
- EFFLUENT DECONTAMINATION SYSTEM: NO
- EFFLUENT pH CONTROL: NO
- OTHER / COMMENTS:
- - ACID NEUTRALIZATION LOCAL TO FUMEHOOD
- - ROUGH-INS FOR DRAINAGE C/W SEDIMENT INTERCEPTER AT ISLAND WORKBENCH FOR FUTURE FLEXIBILITY
- - ROUGH-INS FOR DRAINAGE C/W SEDIMENT INTERCEPTER FOR EQUIP.

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):

HAZARD 1
- CHEMICAL, SMALL AMOUNTS

HAZARD 2

HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: Locally reinforce for furnace (~20 kN)

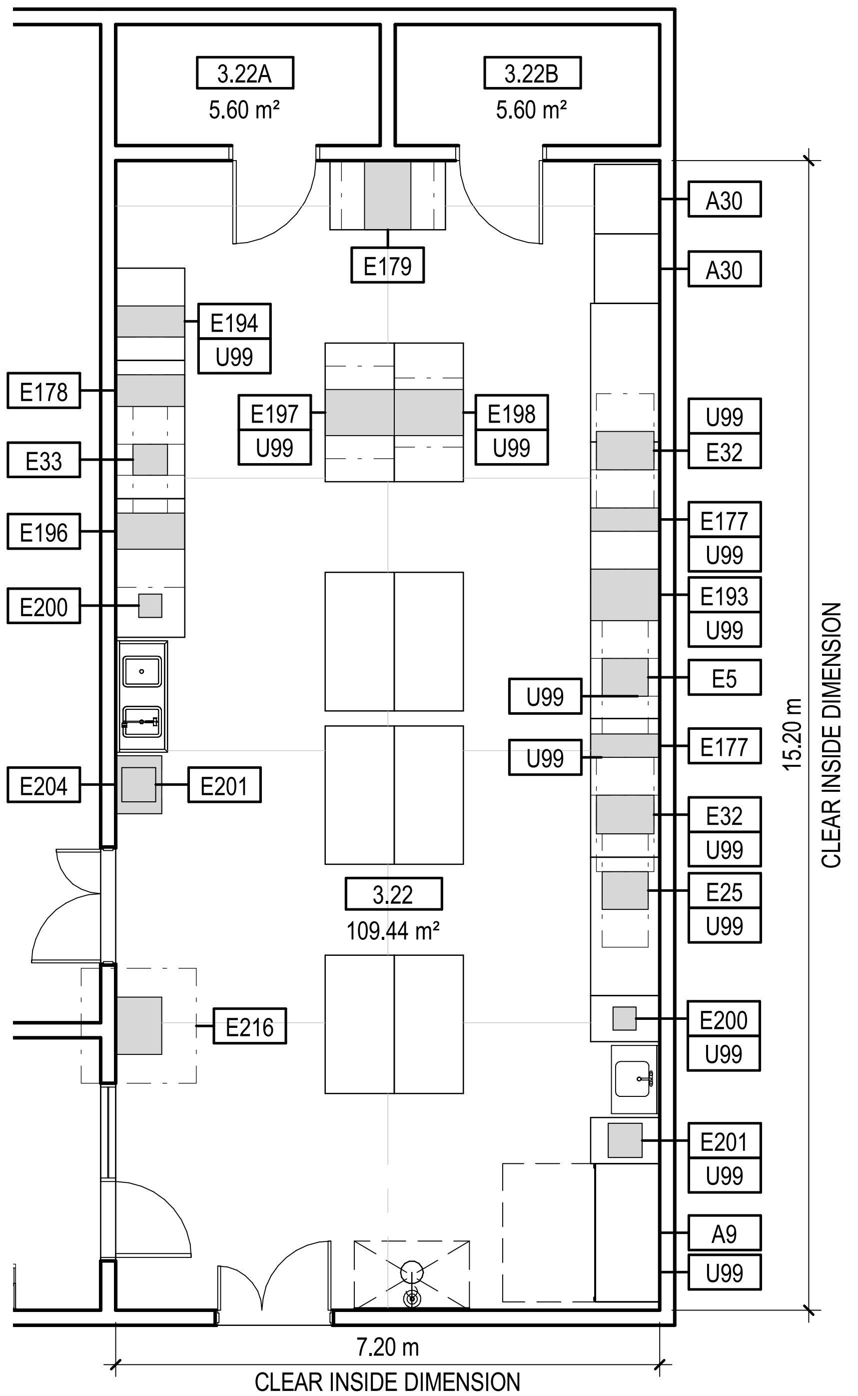
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: YES
- PLUG SPACING: 1m
- FLOOR BOX W TRENCH:
- OTHER / COMMENTS:
- CORDREELS ABOVE MIDDLE BENCHES

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: YES
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: N/A
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.22	**RDS: 030-2**
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LABORATORY		**SPACE NAME: METALLOGRAPHIC SAMPLE PREPARATION**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY CHEMICAL LAB, 3.21 — SECONDARY ADJACENCY MICROSCOPE LAB — TERTIARY ADJACENCY TSB HIGH BAY		



3.22 - METALLOGRAPHIC SAMPLE PREPARATION

1 030-2 1 : 100

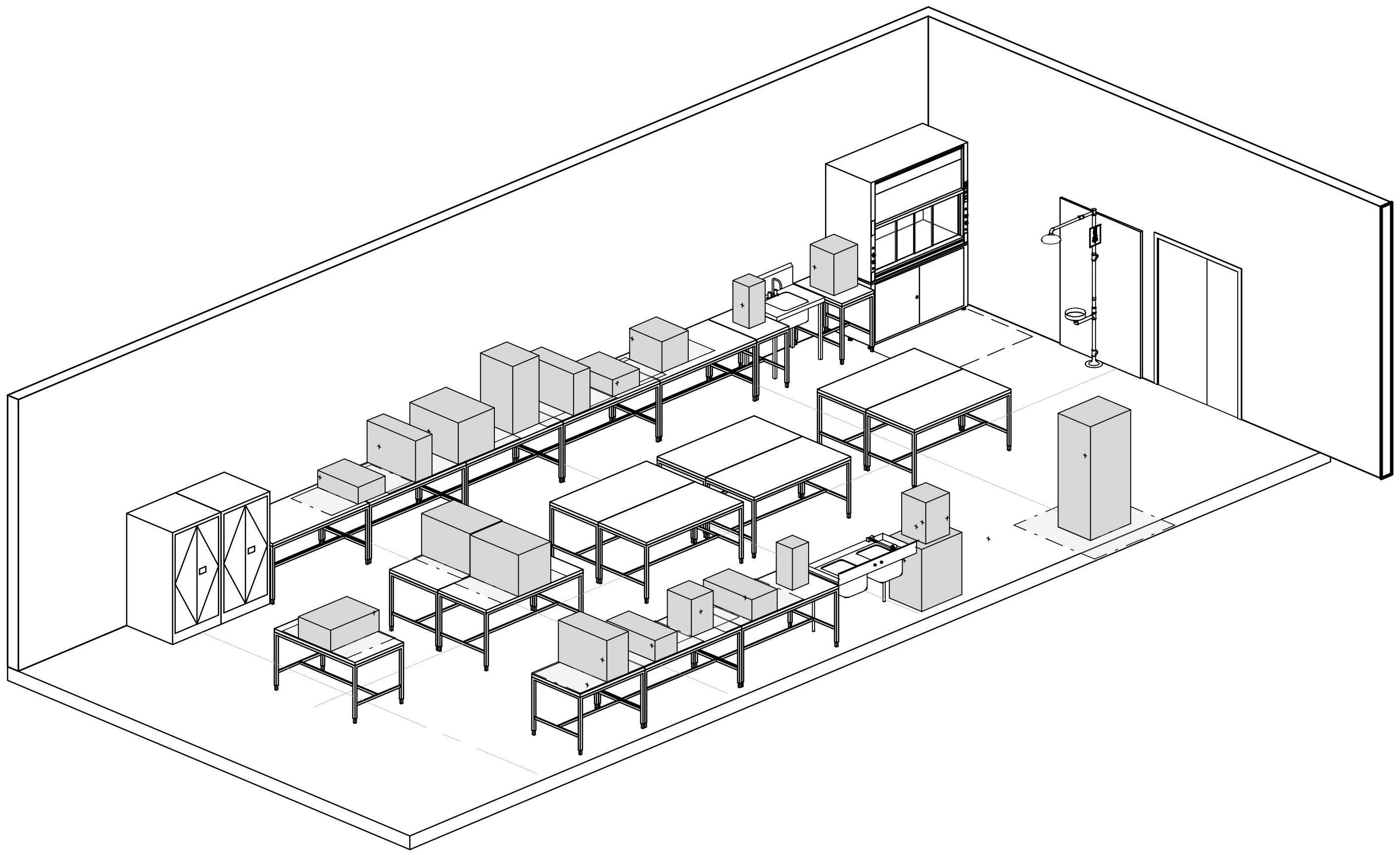
LEGEND

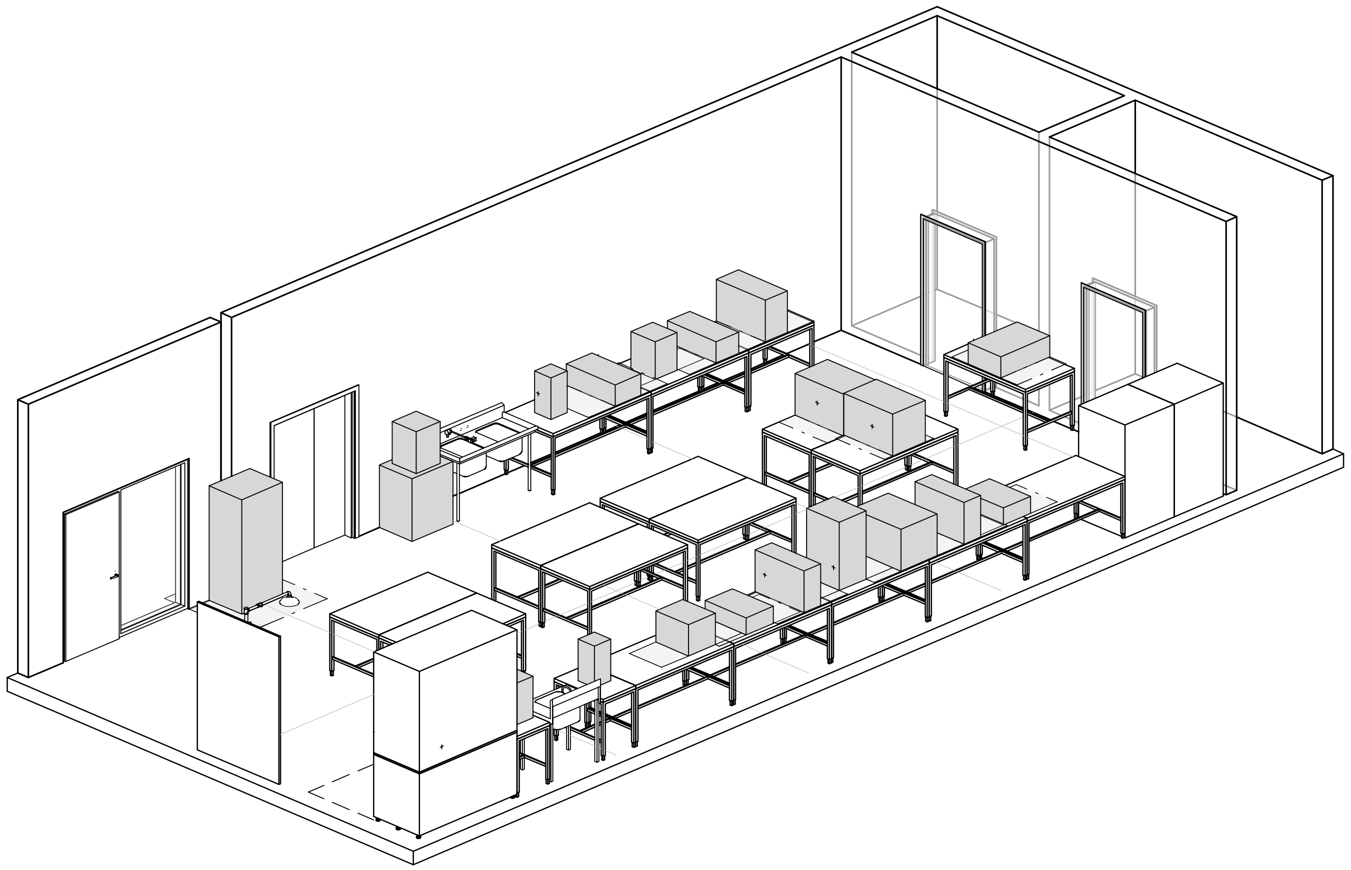
ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A9	FUMEHOOD (GENERAL PURPOSE), 6'	U30	HOT & COLD WATER, LAB
A30	FLAMMABLE STORAGE CABINET	U36	SAFETY EMERGENCY SHOWER AND EYEWASH
A64	WORKBENCH, MOBILE	U38	EYEWASH
		U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E5	POLISHER GRINDER, C/W EUROMET IV POWER HEAD
E25	GIGA 1200 VIBRATORY POLISHER
E32	GRINDER/POLISHER MACHINE
E33	MOUNTING PRESS FOR SPECIMENS
E177	STRUERS LAVAMIN
E178	STRUERS LABOPRESS-3
E179	STRUERS EPOVAC
E193	AUTOMATIC POLISHER
E194	SIMPLIMET 3000 MOUNTING PRESS
E196	BUEHLER HANDIMET 2
E197	BRINELL HARDNESS TESTER
E198	ROCKWELL HARDNESS TESTER
E200	X-SMALL ULTRASONIC CLEANER
E201	SMALL ULTRASONIC CLEANER
E204	DISHWASHER FOR GLASSWARE
E216	EXPLOSION PROOF REFRIGIRATOR

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.22	RDS: 030-3
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:	SPACE NAME: METALLOGRAPHIC SAMPLE PREPARATION
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY CHEMICAL LAB, 3.21 — SECONDARY ADJACENCY MICROSCOPE LAB — TERTIARY ADJACENCY TSB HIGH BAY		





REVISION # & ISSUE DATE: REV 8, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY	SPACE ID#: 3.23	RDS-031-1
CHIEF SCIENTIST: Martin Breton & Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 777.60	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	MATERIAL AND COMPONENT TESTING
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Structural mechanical testing. High temperature mechanical testing. Large open area, column free, mid-bay height to accommodate load frames with instrumentation/access zone and adjacent work surface for researchers are required. Includes overhead crane.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE: YES
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPRACT RESISTANT: YES
- WATER RESISTANT: NO
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: TO STRUCTURE
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS: 7m CLEAR HEIGHT TO U/S STRUCTURE
- PREFERRED VENDOR(S):

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET: YES
- CRANE SUPPORT: YES
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: YES
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: STAINLESS STEEL
- OTHER / COMMENTS: CLOSED STORAGE SHELVING, WORKBANCH
- PREFERRED VENDOR(S):
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: YES
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER: YES
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: REQUIRED
- WINDOWS: YES
- OPERABLE: YES
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLICABLE): 900 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE: (OTHER-DEFINE)
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL: YES
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS: AT MULTIPLE LOCATIONS
- PREFERRED VENDOR(S):
- DOOR TYPE: OVERHEAD DOOR
- PRIMARY LEAF: 4200 mm x 5000mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS: AT MULTIPLE LOCATIONS
- PREFERRED VENDOR(S):
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TMIE TEMPERATURE SETBACK W/ MANUAL OVERRIDE

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST:
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: FUMEHOOD
- MECHANICAL NOISE (DECIBELS / NC): NC50
- COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: YES
- STEAM: NO
- COMP. AIR: YES (UTILITY)
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- PROCESS COOLING WATER: YES
- CITY WATER BACKUP: YES
- HYDRAULIC SUPPLY: YES (FROM PUMP ROOM)
- COMMENTS:
- - CITY WATER BACKUP NOT REQUIRED IF REDUNDANCIES ARE BUILT INTO
- CENTRAL PROCESS COOLING WATER PLANT
- - UTILITIES SERVICING MACHINERY TO RUN THRU RECESSED FLOOR TRENCH

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: UHP ARGON

PLUMBING

FIXTURES
- SINK TYPES: SS DOUBLE BASIN
- SINK DEPTH:
- SINK COUNTS: 1
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP: NO
- PEGBOARD: NO
- FAUCET TYPE: MIXING, SWING SPOUT, DECK MOUNTED
- PIPING MATERIAL:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: YES
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
- OTHER:

DRAINS / VENTS
- FLOOR DRAIN: MULTIPLE
- TRAP DEPTH: 75mm OR 100mm
- MATERIAL
- HEPA FILTERED PLUMBING VENTS: NO
- EFFLUENT DECONTAMINATION SYSTEM: NO
- EFFLUENT pH CONTROL: NO
- OTHER / COMMENTS:
- - DRAINAGE THROUGHOUT CONNECTED TO OIL/GRIT SEPARATOR

FIRE PROTECTION / ALARM

- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: DRY PIPE / PRE-ACTION
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:
- - DEDICATED DOUBLE INTERLOCK PRE-ACTION SYSTEM

HAZARDS

- BUILDING HAZARD CLASS (NBC / NSF):

HAZARD 1
- CHEMICAL, SMALL AMOUNTS

HAZARD 2

HAZARD 3

STRUCTURAL

- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 1.5 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 12 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: 10 t overhead crane. Minimum 5.5 m clear to u/s of crane hook. Maximum equipment weight ~ 4500 kg (10,000 lbs)
- 460 mm (18") slab required under select equipment (Charpy Impact)
- Maximum equipment loads on slab ~ 12750 kg (28000 lbs)
- Localized reinforcing and coordination with equipment suppliers required.

ELECTRICAL / POWER

- CLASS TYPE: EM + NORMAL + UPS
- VOLTAGE / CURRENT / PH 1: 600V / XXX / 3 PHASE
- VOLTAGE / CURRENT / PH 2: 208V / XXX / 3 PHASE
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: YES
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: YES
- PLUG SPACING:
- FLOOR BOX W TRENCH: YES
- OTHER / COMMENTS: IN FLOOR POWER/DATA TO WORKBENCHES
- DEDICATED POWER PANELS IN THE ROOM
- SERVICE MANIFOLDS FROM TEST FRAMES TO PANELS

LIGHTING

- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: YES
- DAYLIGHT CONTROL: YES
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:
- MINIMUM 2 LIGHTING ZONES

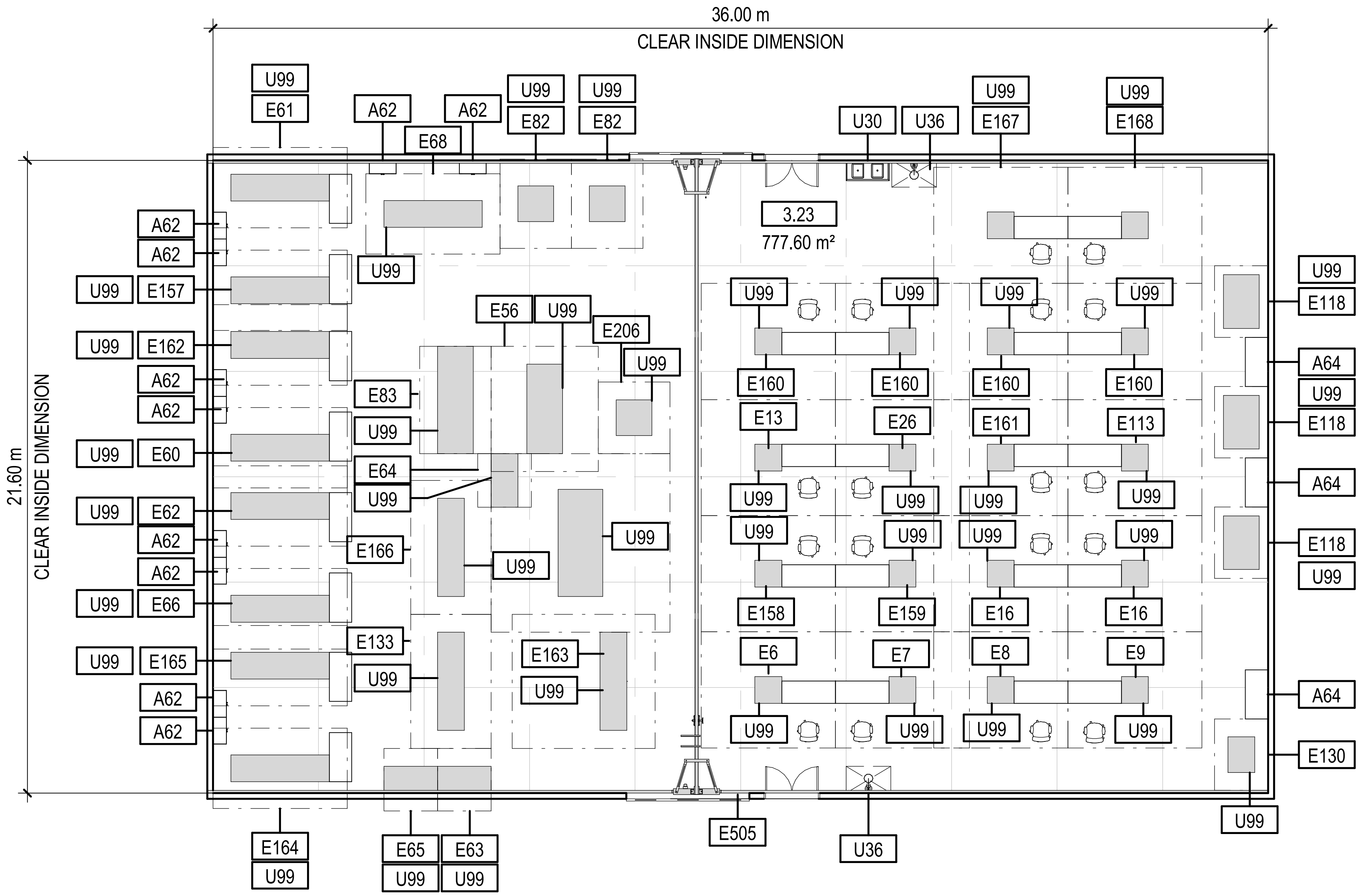
COMMUNICATIONS

- PHONE: YES
- CELLULAR COMMUNICATION: YES
- PUBLIC PAGING: YES
- INTERCOM: NO
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE: OPEN BASKET
- OTHER / COMMENTS:
- 1 PHONE AT EACH DOOR
- DATA CONNECTION TO EACH UNIT CELL

SECURITY

- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 8, 20/05/2021		SPACE ID #: 3.23	RDS: 031-2
DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY		SPACE NAME: MATERIAL AND COMPONENT TESTING
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY 1.1, 2.2, 3.12, 3.27, 4.2, 4.8 & 4.9 — SECONDARY ADJACENCY 1.2, 2.3 & 3.24 — TERTIARY ADJACENCY MATERIAL TESTING AND EVALUATION		



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031-2

3.23 - MATERIAL AND COMPONENT TESTING

1 : 200

LEGEND

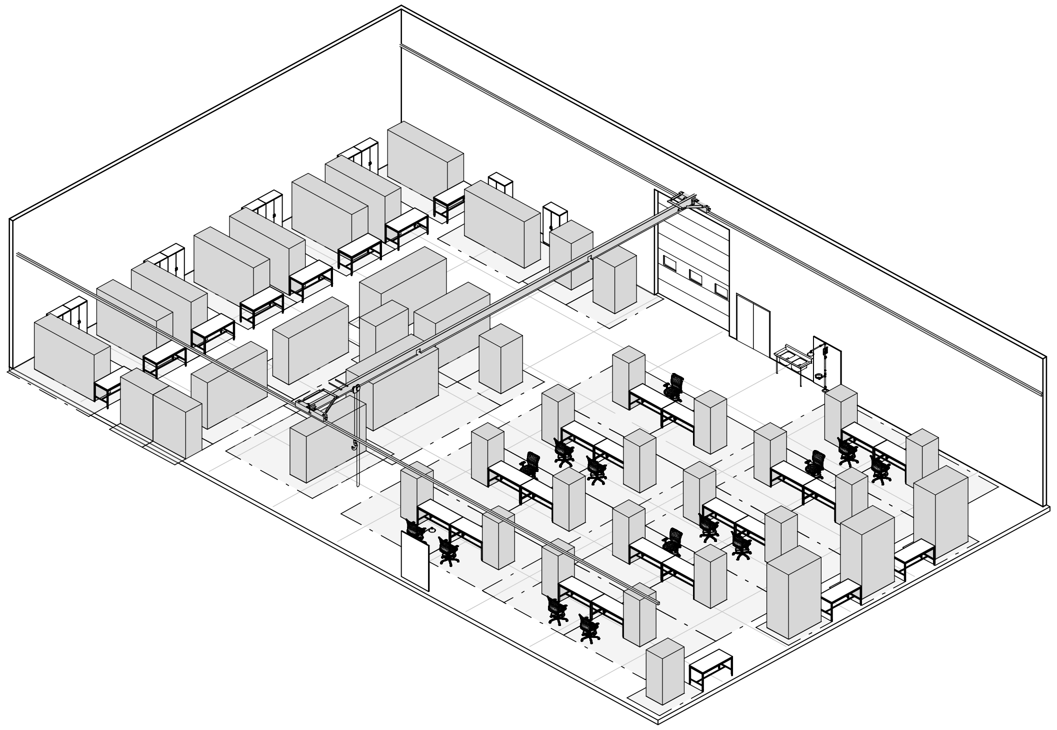
ARCHITECTURAL SYSTEMS / UTILITIES / SYSTEMS

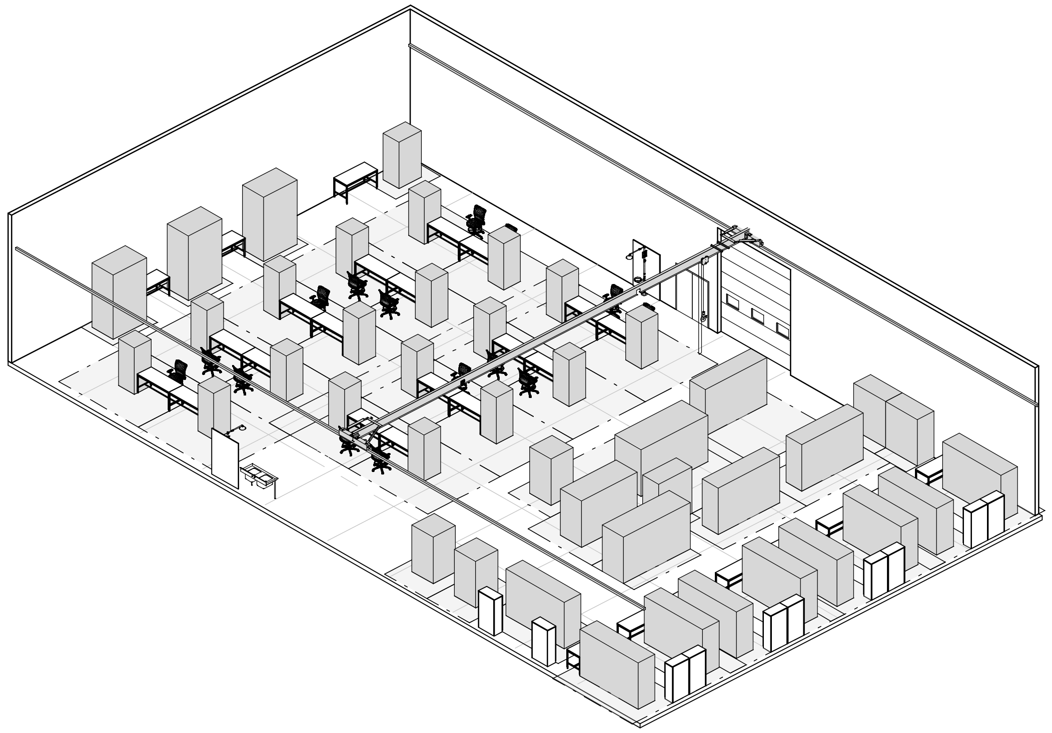
A62	STORAGE SHELVING, TALL, CLOSED	U30	HOT & COLD WATER, LAB
A64	WORKBENCH, MOBILE	U36	SAFETY EMERGENCY SHOWER AND EYEWASH
		U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E6	MECHANICAL TEST MACHINE SYSTEM A	E113	LOAD FRAME #18
E7	MECHANICAL TEST MACHINE SYSTEM B	E118	CREEP FRAME
E8	LOAD FRAME C/W CONTROL CONSOLE 810 A	E130	TENSILE TESTER - UNIVERSAL TESTING MACHINE
E9	NRC FRAME #1 - FRAME 20,000 MTS	E133	LOAD FRAME #15
E13	810 MATERIAL TESTING SYSTEM	E157	LOAD FRAME # 8
E16	100KN HYDRAULIC TEST SYSTEM	E158	LOAD FRAME, 2 COLUMN, 22KIP
E26	MTS LANDMARK FRAME #1	E159	LOAD FRAME, MTS 810.22E LOAD UNIT 22KI
E56	X-RAY DIFFRACTION	E160	MTS 100 KN HYDRAULIC LOAD FRAME
E60	LOAD FRAME # 1	E161	MTS LANDMARK FRAME #16
E61	LOAD FRAME # 6	E162	LOAD FRAME # 2
E62	LOAD FRAME # 7	E163	LOAD FRAME # 5, BI-AXIAL
E63	LOAD FRAME #11	E164	LOAD FRAME #10
E64	ENVIRONMENTAL CHAMBER	E165	LOAD FRAME #3
E65	LOAD FRAME #12	E166	LOAD FRAME #14
E66	LOAD FRAME #4	E167	MTS LOAD FRAME 3 POSTER
E67	LOAD FRAME #13	E168	MTS LOAD FRAME DND
E68	LOAD FRAME #9	E206	TEMP/MOISTURE CONDITIONING CHAMBER
E82	CONDITIONING CHAMBER	E505	10t OVERHEAD CRANE
E83	CHARPY TESTER		

REVISION # & ISSUE DATE: REV 8, 20/05/2021		SPACE ID #: 3.23	**RDS: 031-3**
DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:	**SPACE NAME: MATERIAL AND COMPONENT TESTING**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY 1.1, 2.2, 3.12, 3.27, 4.2, 4.8 & 4.9 — SECONDARY ADJACENCY 1.2, 2.3 & 3.24 — TERTIARY ADJACENCY MATERIAL TESTING AND EVALUATION		





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY	SPACE ID#: 3.24	RDS-032-1
CHIEF SCIENTIST: Martin Breton & Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 48.60	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	EXPERIMENTAL MECHANICS LAB
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Requires open space for laying out large tables/work surface area and open space for equipment.		

ARCHITECTURAL

FLOOR FINISH
TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
SLIP RESISTANCE:
ANTI-STATIC RESISTANCE:
OTHER / COMMENTS: EPOXY PAINT COATING

FLOOR BASE
TYPE (OTHER-DEFINE): ______________
INTEGRAL COVE: YES
OTHER / COMMENTS: EPOXY PAINT COVE BASE

WALL TYPE / CONSTRUCTION
WALL TYPE: MASONRY
SHIELDING:
IMPACT RESISTANT:
WATER RESISTANT:
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE:
WALL FINISH: PAINT
OTHER / COMMENTS:

CEILING
CEILING TYPE: OPEN CEILING
HEIGHT: 4m
FINISH: OPEN CEILING (PAINTED)
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE:
OTHER / COMMENTS: 3m CEILING HEIGHT IS SUFFICIENT

SPECIAL DESIGN CONSIDERATIONS
GASEOUS DECONTAMINATION:
SURFACE DECONTAMINATION:
FIRE EXTINGUISHER CABINET:
CRANE SUPPORT
ELECTROMAGNETIC SHIELDING:
PENETRATION SEALING:
OTHER / COMMENTS:

CASEWORK / MILLWORK
CASEWORK SYSTEM: MODULAR LEG FRAMED
CASEWORK MATERIAL: PAINTED METAL
DEPTH: (OTHER-DEFINE)
UPPER CABINETS: N/A
HEIGHT ADJUSTABLE: YES
BASE CABINETS: N/A
COUNTERTOP MATERIAL: STAINLESS STEEL
OTHER / COMMENTS: MOBILE ADJUSTABLE HEIGHT WORKBENCH,
CLOSED STORAGE SHELVING

CHEMICAL STORAGE:
ACID:
BASE:
FLAMMABLE LIQUIDS:
STORAGE CABINET: YES
STORAGE DRAWER UNIT: NO
SHIELDED STORAGE UNIT: NO
OVERHEAD SERVICE CARRIER: NO
OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
NATURAL LIGHT: NOT REQUIRED
WINDOWS:
OPERABLE:
SAFETY GLAZING:
SAFETY ETCHING:
SHADE CONTROL:
OTHER / COMMENTS:

DOORS/ HARDWARES
DOOR TYPE: DOUBLE
PRIMARY LEAF: 900 mm x 2150 mm
SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE: BOTH SIDES
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

DOOR TYPE:
PRIMARY LEAF:
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

DOOR TYPE:
PRIMARY LEAF:
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
PRIMARY CONTAINMENT DEVICE:
PRIMARY CONTAINMENT DEVICE:
OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
ACCESSIBILITY ELEMENT 1:
ACCESSIBILITY ELEMENT 2:
ACCESSIBILITY ELEMENT 3:
ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
SPACE REQUIRED FOR RECYCLING BIN (m^2):
SPACE REQUIRED FOR COMPOSTING BIN (m2):
UNOCCUPIED PERIOD TEMP. SET BACK:
TEMPERATURE SET BACK MAXIMUM (ºC):
TEMPERATURE SET BACK MINIMUM (ºC):
INDIVIDUAL TEMPERATURE CONTROL:
OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
SETPOINTS (SUMMER): 25ºC
SETPOINTS (WINTER): 21ºC
+/- 1ºC

CONTROLS
CONTROLS TYPE: ALL DIGITAL
CONTROLS FRAMEWORK: BACNet OVER IP
OTHER / COMMENTS:
- UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK W/ MANUAL OVERRIDE

HUMIDITY
STATS: ZONE
SETPOINTS (SUMMER): 50% RH
SETPOINTS (WINTER): 30% RH
+/- 5% RH
TRIM HUMIDIFICATION: NO

VENTILATION
AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
ROOM FILTRATION - EXHAUST: NONE
ROOM FILTRATION - SUPPLY: NONE
AIR CIRCULATION METHOD: 100% SUPPLY
SPECIALITY EXHAUST: N/A
DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
DIRECTIONAL AIRFLOW METHOD: FORCED
PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
ROOM ISOLATION DAMPERS: NONE
FILTRATION TYPE: N/A
PRESSURE AIRFLOW INDICATOR: NONE
EQ. EXHAUST: N/A
MECHANICAL NOISE (DECIBELS / NC): NC45
OTHER / COMMENTS:

MONITORING AND ALARMS
PRESSURE / AIRFLOW INDICATOR: NO
EQUIPMENT MONITORING POINTS: NO
HVAC ALARM RELATIVE PRESSURIZATION: NO
ANIMAL ROOM MONITORING SYSTEM: NO
GAS DETECTION: NO
LIQUID / LEAK DETECTION: NO
TEMP / HUMIDITY: YES

PROCESS PIPING
PROCESS WATER: NO
STEAM: NO
COMP. AIR: YES
BREATHING AIR: NO
ANIMAL WATER: NO
PURIFIED WATER: NO
OTHER PROCESS FLUIDS:
OTHER PROCESS FLUIDS:

GASES
SUPPLY SYSTEM TYPE:
GAS TYPES: N/A

PLUMBING

FIXTURES
SINK TYPES: N/A
SINK DEPTH:
SINK COUNTS:
SINK DIMENSIONS:
INTEGRAL TO CASEWORK / BENCHTOP:
PEGBOARD: NO
FAUCET TYPE: N/A
PIPING MATERIAL TYPE:
SIZE DIAMETER:
VENT SIZE DIAMETER:
SAFETY EMERGENCY SHOWER ANSI 358.1: NO
CORROSIVE MATERIAL:
SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
FLOOR DRAIN: N/A
TRAP DEPTH:
MATERIAL
HEPA FILTERED PLUMBING VENTS:
EFFLUENT DECONTAMINATION SYSTEM
EFFLUENT pH CONTROL
OTHER / COMMENTS:

FIRE PROTECTION / ALARM
HAZARD CLASS:
SPRINKLER SYSTEM: YES
SPRINKLER SYSTEM TYPE: WET PIPE
FIRE DETECTION: NORMAL (TO CODE)
ALARM METHOD: NORMAL
OTHER / COMMENTS:

HAZARDS
BUILDING HAZARD CLASS (NBC / NSF):
HAZARD 1
HAZARD 2
HAZARD 3

STRUCTURAL
STRUCTURAL DESIGN IMPLICATIONS:
ROLLING LOAD LIMITS:
VIBRATION CRITERA:
FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
STRUCTURAL SHIELD REQUIREMENT:
CEILING LOADING:
SPECIAL PENETRATIONS:
OTHER / COMMENTS:

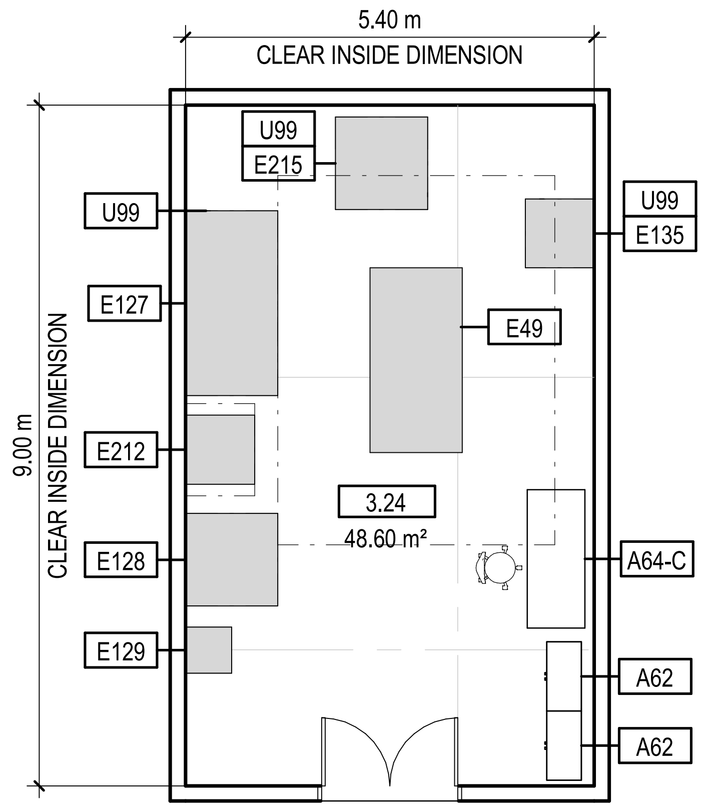
ELECTRICAL / POWER
CLASS TYPE: NORMAL
VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
VOLTAGE / CURRENT / PH 2: 600V / XXX / 3 PH
SPECIAL NEMA PLUG ARRANGEMENT:
POWER DENSITY:
OVERHEAD SERVICE CARRIER: N/A
ISOLATED GROUNDING: YES
GROUND FAULT PROTECTION: N/A
WEATHER PROOF COVER: N/A
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
TYPE IP RATING HERE:
RACEWAY: YES
PLUG SPACING: 1m
FLOOR BOX W TRENCH: NO
OTHER / COMMENTS:
CORDREELS ABOVE MIDDLE BENCHES

LIGHTING
SPECIALIZED LIGHTING: NO
SPECIALIZED CONTROL: NO
MOUNT: PENDANT CEILING
FIXTURE OUTPUT: DIRECT
LIGHT LEVEL (LUX):
LIGHT COLOUR TEMP (KELVIN): 4000
DIMMING SYSTEM: YES
WHITE TUNING:
TASK LIGHTING: NO
SCENE/ZONE CONTROL: YES
OCCUPANCY SENSORS: YES
NIGHT LIGHT: NO
DAYLIGHT CONTROL: NO
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
SAFETY LIGHTS: NO
A/V EQUIPMENT INTERFACE: NO
OTHER / COMMENTS:

COMMUNICATIONS
PHONE: YES
CELLULAR COMMUNICATION:
PUBLIC PAGING: YES
INTERCOM:
DATA TYPE / POINTS: COPPER RJ45
DATA PLUG SPACING:
WIRELESS: YES
CABLE TRAY TYPE:
OTHER / COMMENTS:

SECURITY
CONNECTION TO CENTRAL MONITORING STATION:
CCTV:
EMERGENCY DISTRESS CALL:
FAIL-SAFE HARDWARE:
INTRUDER SYSTEM:
ACCESS CONTROL (OPTIONS BELOW)
-
-
-
-
SECURITY EQUIPMENT:
SECURITY ZONES:
OTHER / COMMENTS:
Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.24	RDS: 032-2
DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY		SPACE NAME: EXPERIMENTAL MECHANICS LAB
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY: 3.23 MATERIAL AND COMPONENT TESTING, NDE — TERTIARY ADJACENCY		



1 032-2
3.24 - EXPERIMENTAL MECHANICS LAB
1 : 100

LEGEND

ARCHITECTURAL SYSTEMS

A62	STORAGE SHELVING, TALL, CLOSED
A64-C	WORKBENCH, STATIONARY

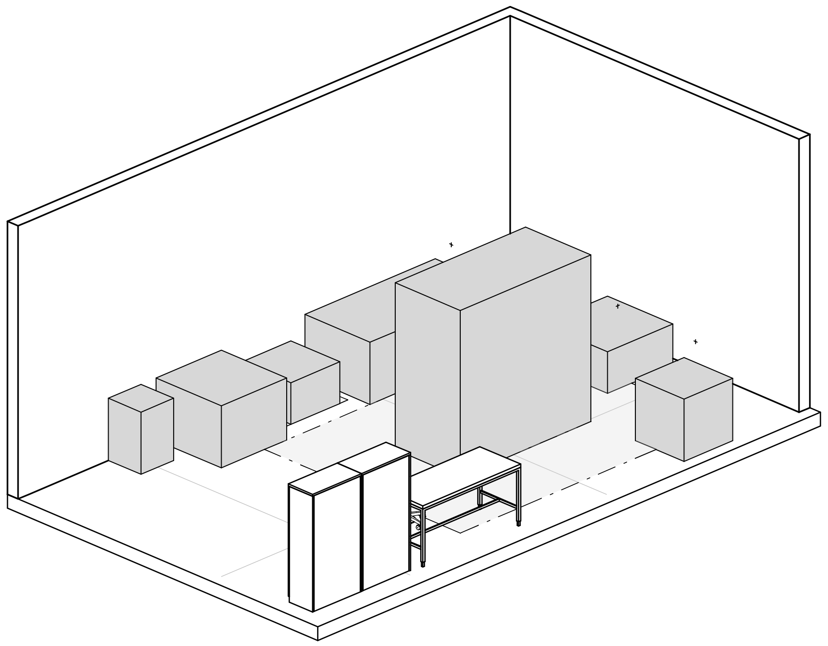
UTILITIES / SYSTEMS

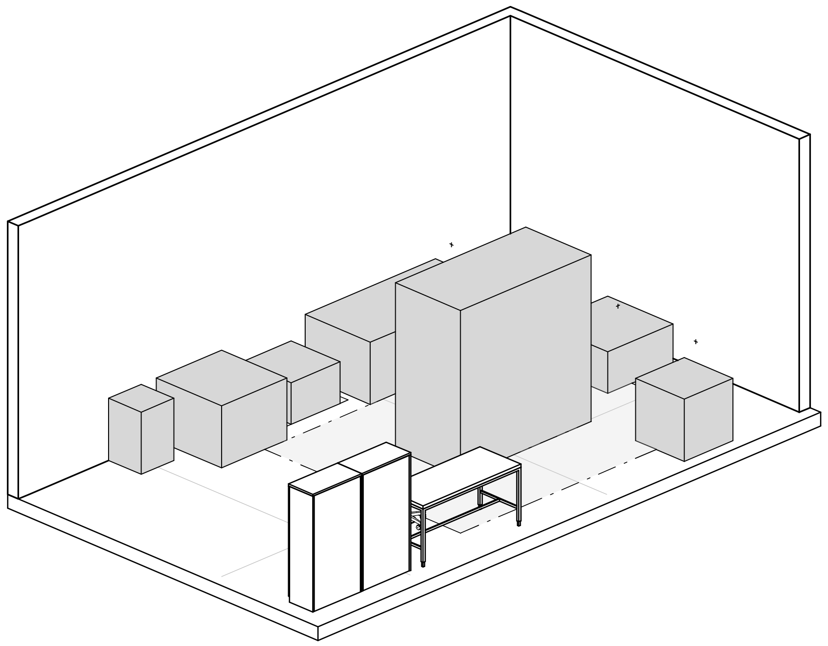
U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E49	OPTICAL TABLE
E127	GRANITE TABLE - LARGE
E128	GRANITE TABLE - MEDIUM
E129	GRANITE TABLE - SMALL
E135	BLACKBODY SOURCE AND CONTROLLER SYSTEM
E212	MICROSCOPE WITH GRANITE TABLE
E215	MICROSCOPE - WILD M8 MEDICAL

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.24	**RDS: 032-3**
DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:	**SPACE NAME: EXPERIMENTAL MECHANICS LAB**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY: 3.23 MATERIAL AND COMPONENT TESTING, NDE — TERTIARY ADJACENCY		





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY	SPACE ID#: 3.25	RDS-033-1
CHIEF SCIENTIST: Martin Breton & Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 518.82	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 7AM-5PM	SPECIE USE:	NON DESTRUCTIVE EVALUATION
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Inspection of airframe and engine materials for the detection of defects, cracks and other discontinuities. This may require the use of manual and ultrasonic techniques.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS: EPOXY PAINT COATING

FLOOR BASE
- TYPE (OTHER-DEFINE): _______________
- INTEGRAL COVE: YES
- OTHER / COMMENTS: EPOXY PAINT COVE BASE

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: TO STRUCTURE
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE:
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS: 5m CEILING TO U/S STRUCTURE

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: REQUIRED
- WINDOWS: YES
- OPERABLE: YES
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL: YES
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm X 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS: AT MULTIPLE LOCATIONS

- DOOR TYPE: OVERHEAD DOOR
- PRIMARY LEAF: 3000 mm x 4200 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL: PRIMARY LEAF
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE:
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER/COMMENTS: X-RAY ROOM SHALL MAINTAIN 18ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK C/W LOCAL OCCUPANCY OVERRIDE

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: E43 LIQUID PENETRANT SYSTEM
- MECHANICAL NOISE (DECIBELS / NC): NC45
- OTHER / COMMENTS:
- LOW MIN. AC/Hr RATE ACHIEVED THRU DEMAND CONTROL VENTILATION SYS.
- DEDICATED EXHAUST SYSTEM FOR LIQUID INSPECTION SYS. E-43 AND MPI E42

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: YES (IMMERSION TANK)
- STEAM: NO
- COMP. AIR: YES (FOR MPI &IMMERSION TANK)
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: SS DOUBLE BASIN
- SINK DEPTH:
- SINK COUNTS: 2
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE: MIXING, GOOSENECK, DECK MOUNTED
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
- COMMENTS: - DOMESTIC COLD WATER SOURCE REQUIRED IN VICINITY OF ULTRASONIC TANK. EYEWASH INTEGRATED TO SINK.

DRAINS / VENTS
- FLOOR DRAIN: SINGLE POINT
- TRAP DEPTH: 75mm OR 100mm
- MATERIAL: CARBON STEEL
- HEPA FILTERED PLUMBING VENTS: NO
- EFFLUENT DECONTAMINATION SYSTEM: NO
- EFFLUENT pH CONTROL: NO
- OTHER / COMMENTS:
- - LOCATE FLOOR DRAIN IN VICINITY OF ULTRASONIC TANK

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: DOUBLE INTERLOCK PRE-ACTION SYSTEM
- FIRE DETECTION:
- ALARM METHOD:
- OTHER / COMMENTS:
- - PRE-ACTION SYSTEM DEDICATED TO ZONE

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- **HAZARD 1**
- CHEMICAL, SMALL AMOUNTS
- **HAZARD 2**
- RADIATION
- **HAZARD 3**

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa + see note
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT: TBC
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: Locally reinforce for water tank immersion system (~300 kN)
- 500 lbs monorail hoist above water tank

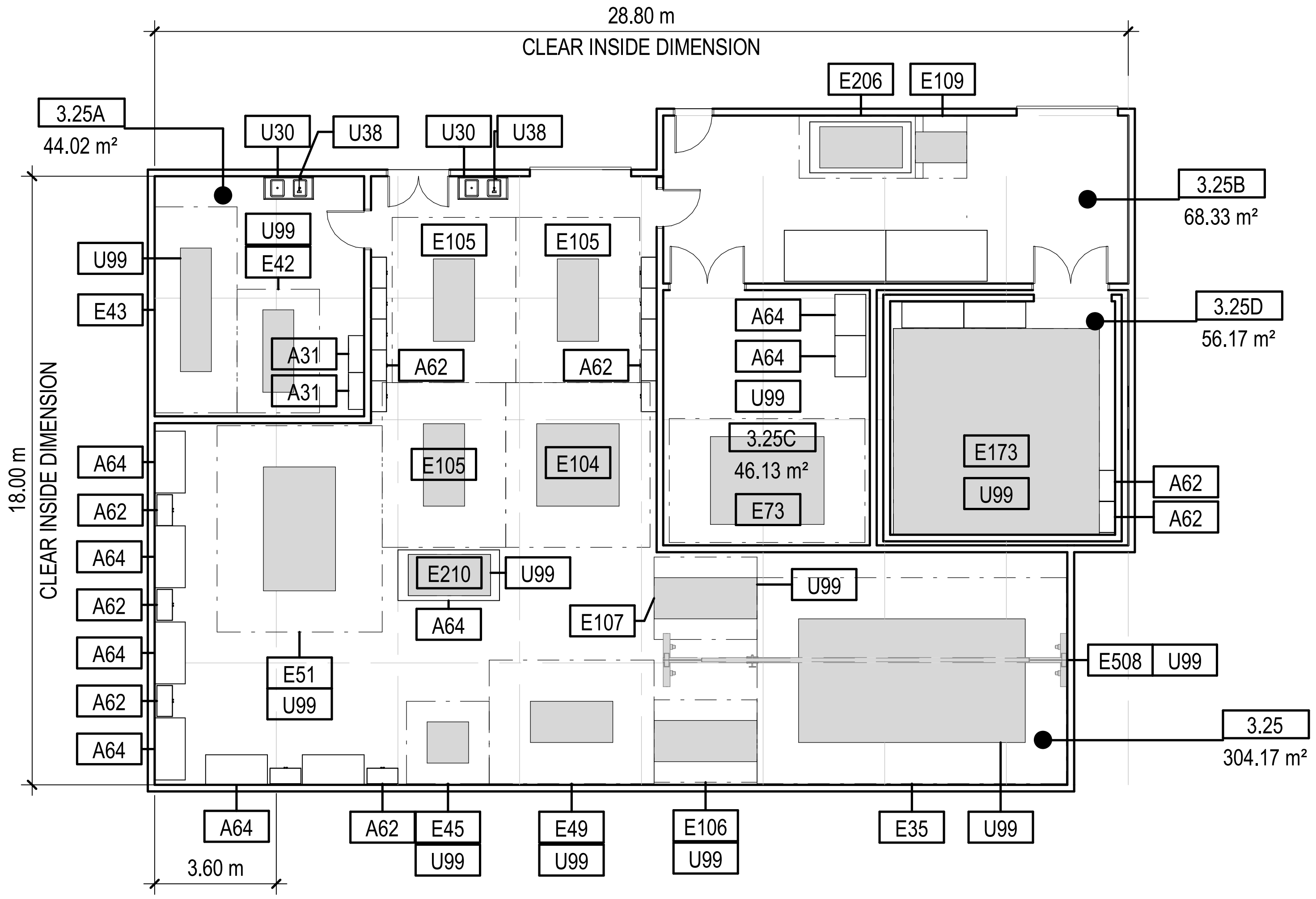
ELECTRICAL / POWER
- CLASS TYPE: NORMAL + UPS
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3PH
- VOLTAGE / CURRENT / PH 2: 600V / XXX / 3 PH
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: YES
- PLUG SPACING:
- FLOOR BOX W TRENCH: YES
- OTHER / COMMENTS:
- WIREMOLD ABOVE WORKBENCHES

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT:
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS:
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: YES
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:
- DIMMABLE IN LPI/MPI AND X-RAY VIEWING AREA

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.25	**RDS: 033-2**
DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY		**SPACE NAME: NON DESTRUCTIVE EVALUATION**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY: NDE EQ.STORAGE, TSB HIGH BAY — TERTIARY ADJACENCY: MATERIAL COMPONENT TESTING		



1 033-2 3.25 - NON DESTRUCTIVE EVALUATION
1 : 200

LEGEND

ARCHITECTURAL SYSTEMS

A24	FLIP TOP TABLE
A31	VENTED ACIDS STORAGE CABINET
A62	STORAGE SHELVING, TALL, CLOSED
A64	WORKBENCH, MOBILE

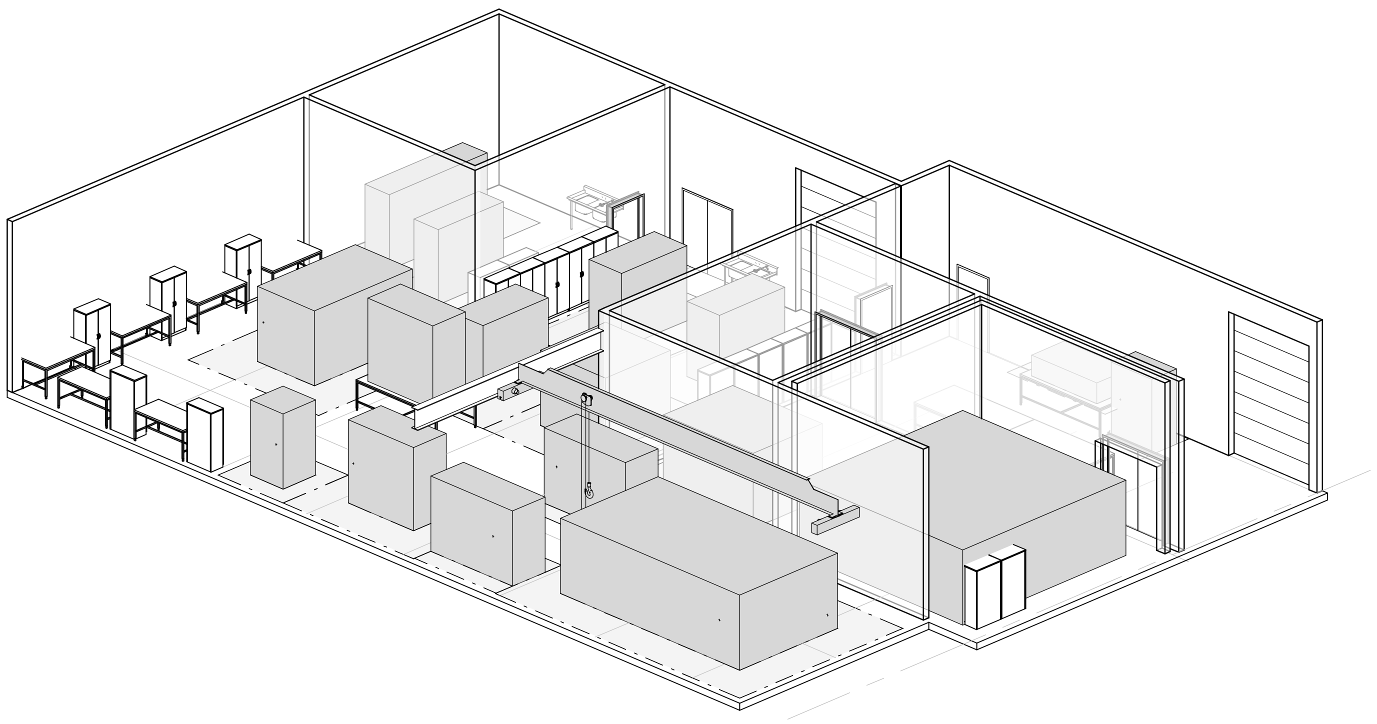
UTILITIES / SYSTEMS

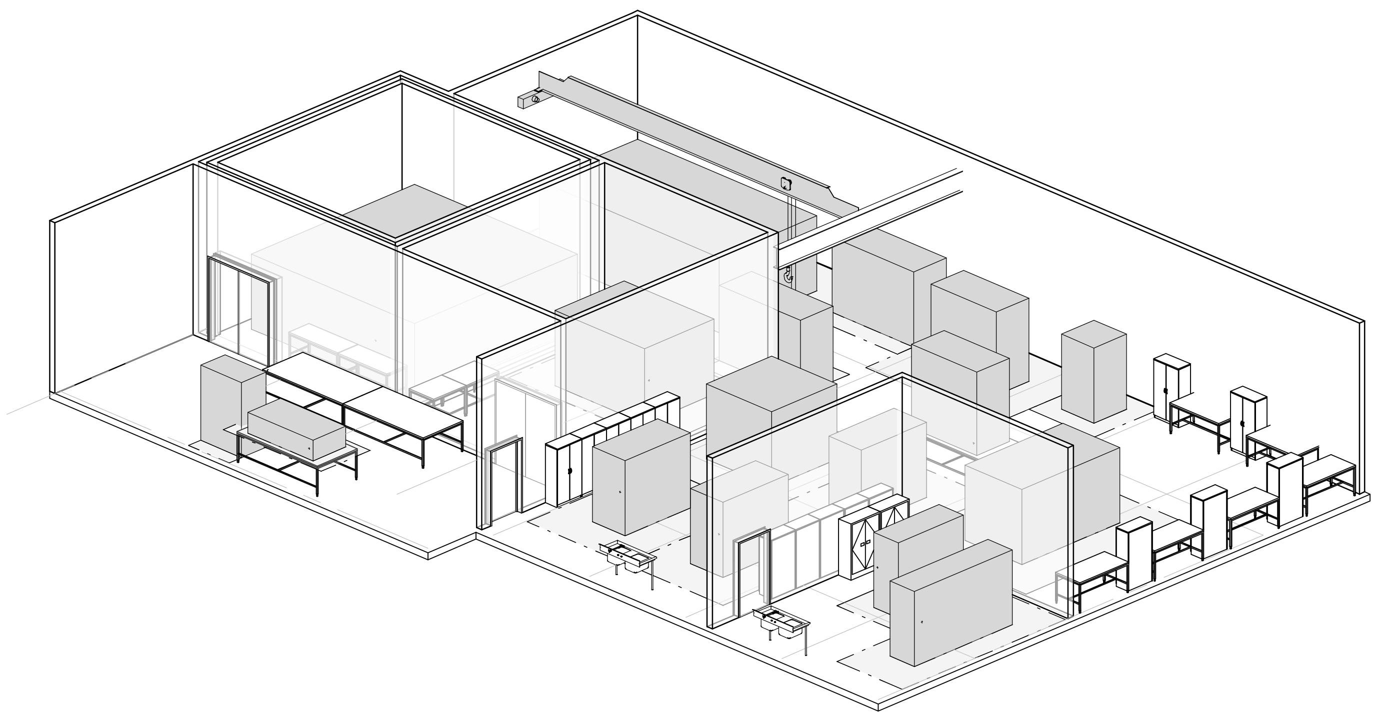
U30	HOT & COLD WATER, LAB
U38	EYEWASH
U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E8A	PROJECTION SCREEN
E35	INSPECTION SYSTEM ULTRASONIC
E42	MAGNETIC PARTICLE INSPECTION UNIT - MAGNAFLUX
E43	INSPECTION SYSTEM, LIQUID PENETRANT
E45	ECHOTHERM CENTRAL UNIT
E49	OPTICAL TABLE
E51	OPTICAL TABLE CLEANTOP II
E73	X-RAY SYSTEM
E104	SOUND PROOF ROOM
E105	WORK TABLE
E106	CT SCANNER #1
E107	CT SCANNER #2
E109	FILM FRIDGE
E173	X-RAY SYSTEM, PORTABLE LORAD
E206	CRXVISION COMPUTED RADIOGRAPHY SCANNER
E210	PARKER POSITIONING SYSTEM
E508	500LB MONORAIL CRANE

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.25	RDS: 033-3
DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: LABORATORY		SPACE NAME: NON DESTRUCTIVE EVALUATION
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY: NDE EQ.STORAGE , TSB HIGH BAY — TERTIARY ADJACENCY: MATERIAL COMPONENT TESTING		





REVISION # & ISSUE DATE: REV 6, 20/05/2021	**DEPARTMENTS / GROUP NAME: TSTS HUB**	**SPACE TYPE: LABORATORY**	**SPACE ID#: 3.26**	**RDS-034-1**
CHIEF SCIENTIST: Martin Breton & Rick Kearsey	**CONTAINMENT RISK LEVEL: CL2**		**AREA (m2): 51.84**	**Space Name:**
CMO REP: Ann Marie Sibbald	**LAB CERTIFICATION REQUIREMENTS: N/A**	**OPERATING HOURS: 7AM-5PM**	**SPECIE USE: N/A**	**PHYSICAL AND FRACTO ANALYSIS ROOM**
LC REP: Sophie Harvey	**ROOM FUNCTION AND ACTIVITES:**	**Wet/dry Laboratory. Requires benching environment, and large tables/work surface to lay out samples.**		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE (OTHER-DEFINE): ________________
- INTEGRAL COVE: YES
- OTHER / COMMENTS: CONCRETE WITH EPOXY COATING COVE BASE

WALL TYPE / CONSTRUCTION
- WALL TYPE: 5/8" GYP.
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: REQUIRED
- WINDOWS: YES
- OPERABLE: YES
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL: YES
- OTHER / COMMENTS: REQUIRES ABILITY TO BLACK OUT NATURAL LIGHT FOR LAB ACTIVITIES

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER / COMMENTS:

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK C/W LOCAL OCCUPANCY OVERRIDE

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC45
- OTHER / COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: YES
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:
- COMMENTS:
- - COMP. AIR: PULL DOWN REEL AND ON BENCH-TOP

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: SS DOUBLE BASIN
- SINK DEPTH:
- SINK COUNTS: 1
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP: NO
- PEGBOARD: NO
- FAUCET TYPE: TOUCHLESS, GOOSENECK
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
- COMMENTS: - SHOWER PLUMBING SERVICES ROUGH-IN PROPOSED BY FW FOR FUTURE FLEXIBILITY.
- - EYE WASH INTEGRATED WITH SINK

DRAINS / VENTS
- FLOOR DRAIN: SINGLE POINT
- TRAP DEPTH: 75mm OR 100mm
- MATERIAL: CARBON STEEL
- HEPA FILTERED PLUMBING VENTS: NO
- EFFLUENT DECONTAMINATION SYSTEM: NO
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):

HAZARD 1

HAZARD 2

HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

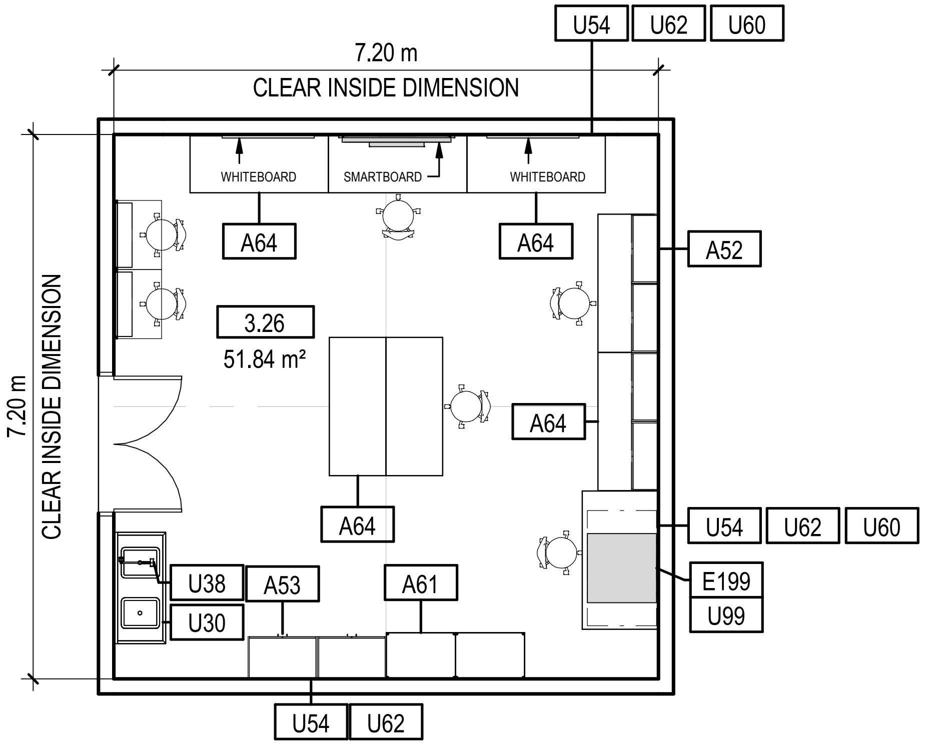
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:

LIGHTING
- SPECIALIZED LIGHTING: YES
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: YES
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:
- PULL DOWN LIGHTS OVER CENTRE BENCHES

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.26	RDS: 034-2
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:	SPACE NAME: PHYSICAL AND FRACTO ANALYSIS ROOM
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: TSB HIGH BAY — SECONDARY ADJACENCY: METALLOGRAPHIC SAMPLE PREPARATION — TERTIARY ADJACENCY: SEM LABS		



1 034-2 **3.26 - PHYSICAL AND FRACTO ANALYSIS ROOM**

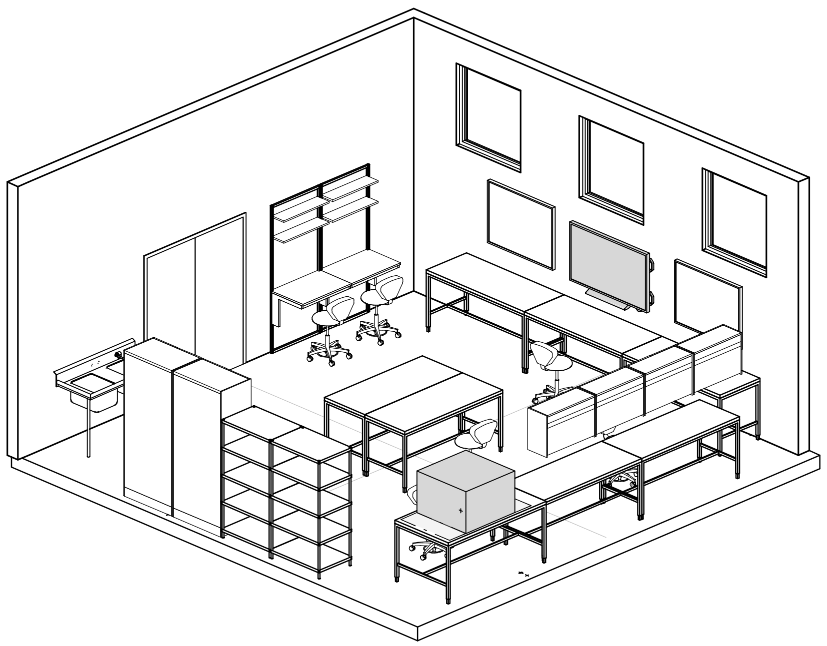
1 : 100

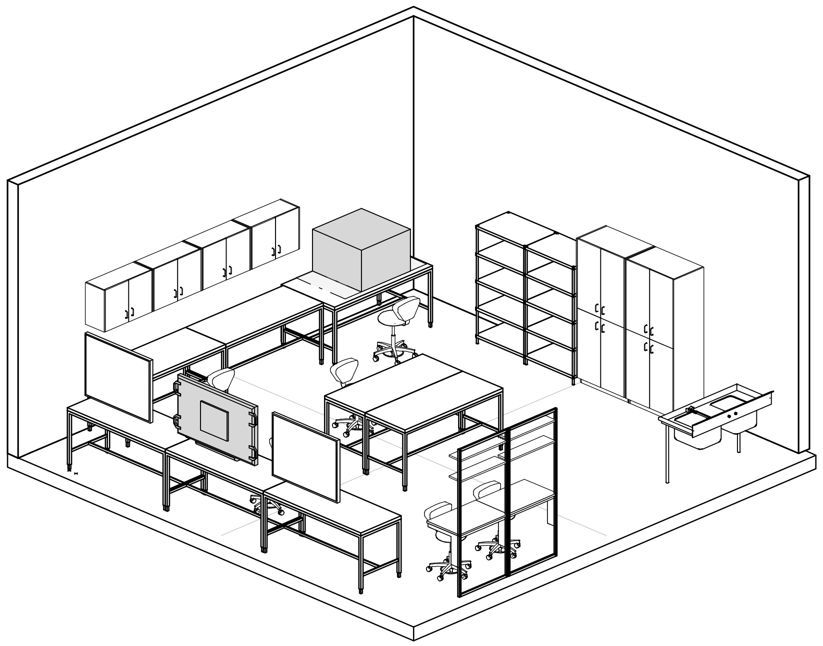
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A46	CASEWORK, COUNTER	U30	HOT & COLD WATER, LAB
A51	CASEWORK, OPEN UPPER SHELVING	U38	EYEWASH
A52	CASEWORK, CLOSED UPPER SHELVING	U54	POWER, 120V., WIREWAY
A53	CASEWORK, TALL STORAGE CABINET	U60	UNDERSHELF TASK LIGHT
A61	STORAGE SHELVING, TALL, OPEN 36"	U62	DATA, WIREWAY
A64	WORKBENCH, MOBILE	U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT			
E199	FTIR		

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 3.26		RDS: 034-3
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LABORATORY			SPACE NAME: PHYSICAL AND FRACTO ANALYSIS ROOM
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: TSB HIGH BAY — SECONDARY ADJACENCY: METALLOGRAPHIC SAMPLE PREPARATION — TERTIARY ADJACENCY: SEM LABS			





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	SPACE ID#: 3.27	RDS-035-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 77.76	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	MATERIAL TESTING AND EVALUATION
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Requires open area for lab equipment and preparation of components for testing, a combination of work surface areas with task lighting and shelving. Activities may also include soldering and painting. Painting booth required with appropriate exhaust/ventilation and closed cabinets for storage.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND PAINTED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS: epoxy coating

FLOOR BASE
- TYPE (OTHER-DEFINE): ________________
- INTEGRAL COVE: YES
- OTHER / COMMENTS: epoxy cove base

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: YES
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: STAINLESS STEEL
- OTHER / COMMENTS: MOBILE ADJUSTABLE HEIGHT WORKBENCH, TALL STORAGE CABINET
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: YES
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS: NATURAL LIGHT PREFERRED

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: PAINT BOOTH DEDICATED EXHAUST, SPARK RESISTANT, MAN
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST:
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:
- - COMMON EXTRACTION ARM EXHAUST SHARED BETWEEN TWO SOLDERING STATI

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES
- PAINT BOOTH EXHAUST SYSTEM MONITORING AND ALARM: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: YES
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: SS SINGLE BASIN
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD: NO
- FAUCET TYPE: N/A
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL:
- SAFETY EMERGENCY EYEWASH ANSI 358.1: YES
- EYEWASH INTEGRATED TO SINK

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:
- DRAINAGE THROUGHOUT CONNECTED TO OIL/GRIT SEPARATOR
- NO FLOOR DRAINS IN EQUIPMENT/CIRCULATION/FLEX ZONES

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- CHEMICAL, SMALL AMOUNTS
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 7.2 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

ELECTRICAL / POWER

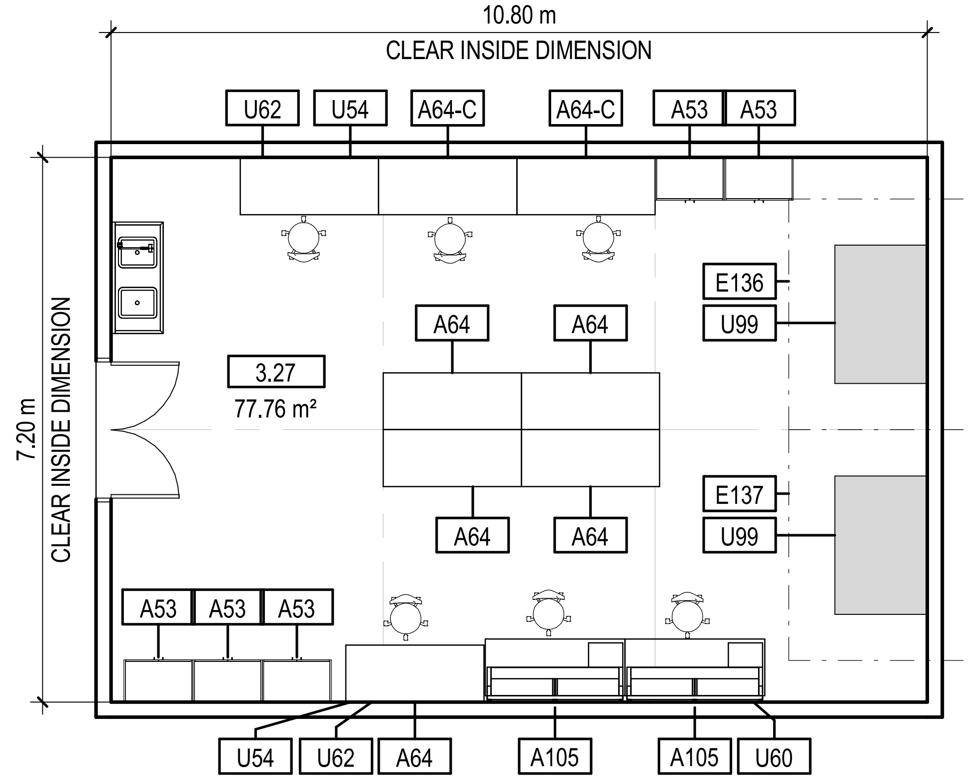
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: YES
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: YES
- PLUG SPACING: 1m
- FLOOR BOX W TRENCH: YES
- OTHER / COMMENTS:

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: YES
- WHITE TUNING:
- TASK LIGHTING: YES
- SCENE/ZONE CONTROL: YES
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:
- SEPERATE LIGHTING ZONE AROUND MICROSCOPE

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.27	**RDS: 035-2**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY		**SPACE NAME:** **MATERIAL TESTING AND EVALUATION**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MATERIAL AND COMPONENT TESTING — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



1 / 035-2 — 3.27 - MATERIAL TESTING AND EVALUATION

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LEGEND

ARCHITECTURAL SYSTEMS

A53	CASEWORK, TALL STORAGE CABINET
A64	WORKBENCH, MOBILE
A64-C	WORKBENCH, STATIONARY
A105	SOLDERING STATION

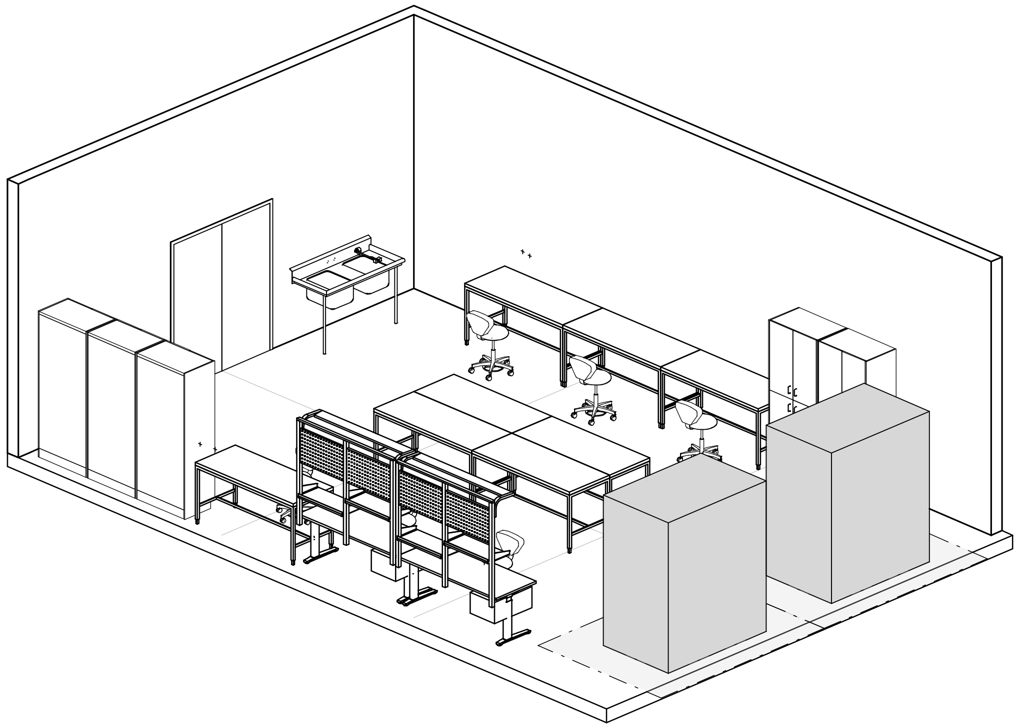
UTILITIES / SYSTEMS

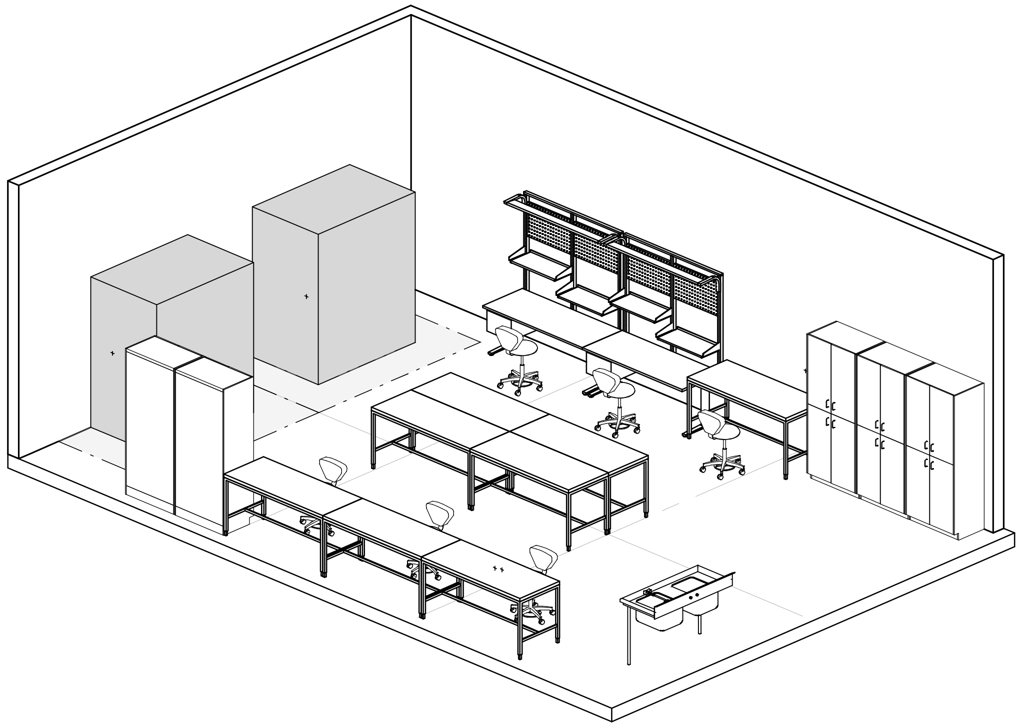
U30	HOT & COLD WATER, LAB
U38	EYEWASH
U54	POWER, 120V., WIREWAY
U62	DATA, WIREWAY
U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E136	CLARK INSTRUMENTDIGITAL HARDNESS TESTER
E137	TESA MICROHITE 3D MEASURING SYSTEM

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 3.27	RDS: 035-3
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LABORATORY	LAB CERTIFICATION REQUIREMENTS:	SPACE NAME: MATERIAL TESTING AND EVALUATION
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MATERIAL AND COMPONENT TESTING — SECONDARY ADJACENCY — TERTIARY ADJACENCY		





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT	SPACE ID#: 4.1	RDS-036-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 97.20	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	SPIN AND BURNER RIG EQUIPMENT SUPPORT
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Dedicated equipment lab support room for Burner Rig Rooms.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m²):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: TO STRUCTURE
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS: 7m CEILING HEIGHT TO U/S STRUCTURE

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: REQUIRED
- WINDOWS: YES
- OPERABLE: YES
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL: YES
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE: OVERHEAD DOOR
- PRIMARY LEAF: 4200 mm x 5000 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): UNCONTROLLED
- SETPOINTS (WINTER): 18ºC
- +/- 1ºC
- OTHER / COMMENTS:

CONTROLS
- CONTROLS TYPE:
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): UNCONTROLLED
- SETPOINTS (SUMMER): UNCONTROLLED
- +/- % RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: YES
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:
- - DEDICATED VENT. SYSTEM INDEPENDENT OF BASE BUILDING SYSTEM
- - DEDICATED VS MAKE-UP AIR FAN OPERATES TO MAINTAIN SPACE AT SLIGHTLY POSITIVE PRESSURE.
- - DEIDCATED VARIABLE SPEED MAKE UP AIR FAN REQUIRED.

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION:
- LIQUID / LEAK DETECTION:
- TEMP: YES
- COMMENTS: - FUEL FARM TANK MONITORING SYSTEM TO BE LOCATED IN EQUIPMENT SUPPORT ROOM

PROCESS PIPING
- PROCESS WATER: YES
- STEAM: NO
- COMP. AIR: YES
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- PROCESS COOLING: YES
- OTHER PROCESS FLUIDS:
- COMMENTS:
- - PROCESS WATER: NON POTABLE WATER HOSE-BIBB
- - COMP AIR: HIGH PRESSURE COMP AIR FROM DEDICATED COMPRESSOR. LOWER PRESSURE UTILITY AIR TO BE PROVIDED.

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPE: FLOOR MOP SINK
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: SINGLE POINT
- TRAP DEPTH: 75mm OR 100mm
- MATERIAL: CARBON STEEL
- HEPA FILTERED PLUMBING VENTS: NO
- EFFLUENT DECONTAMINATION SYSTEM: NO
- EFFLUENT pH CONTROL: NO
- OTHER / COMMENTS: OIL SEPARATOR TANK

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- **HAZARD 1**
- OIL - ISO GRADE 46
- **HAZARD 2**
- **HAZARD 3**

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: 1.0 t overhead crane for compressor maintenance

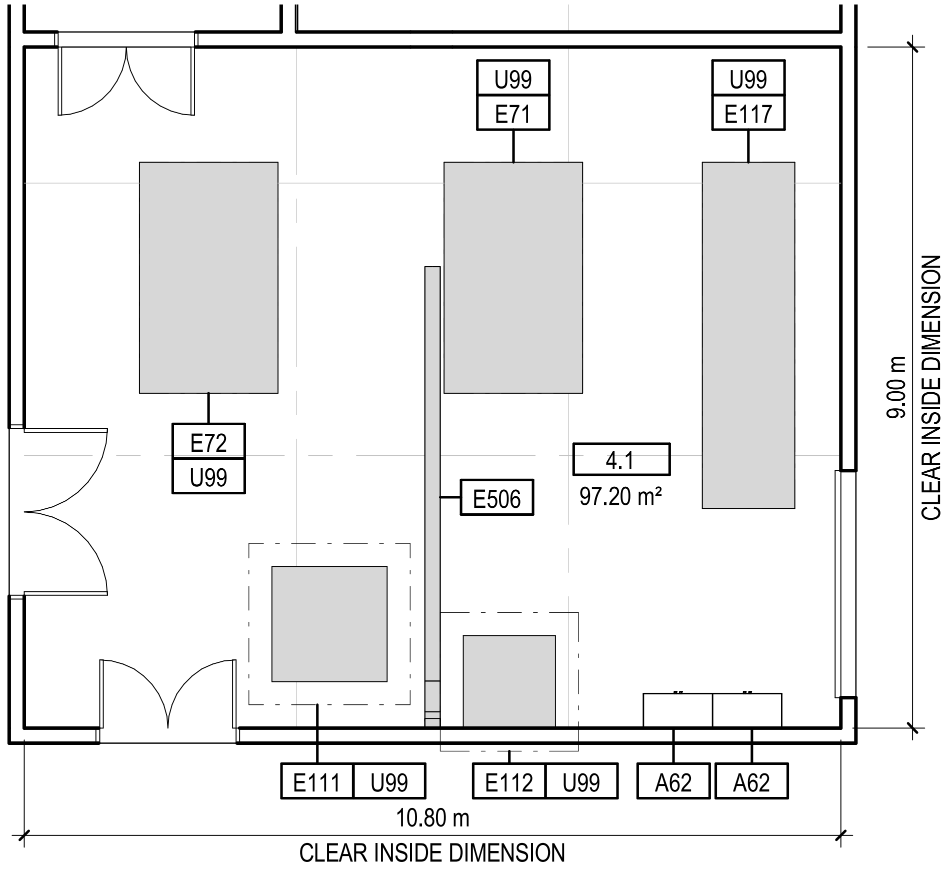
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2: 600V / XXX / 3 PH
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- EQUIPMENT CONNECTIONS

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS:
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM: NO
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:
- NETWORK CONNECTIONS FOR EQUIPMENT

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.1	RDS: 036-2
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT		SPACE NAME: SPIN AND BURNER RIG EQUIPMENT SUPPORT
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: SPIN RIG , BURNER RIGS — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



1 (036-2) 4.1 - SPIN AND BURNER RIG EQUIPMENT SUPPORT

1 : 100

LEGEND

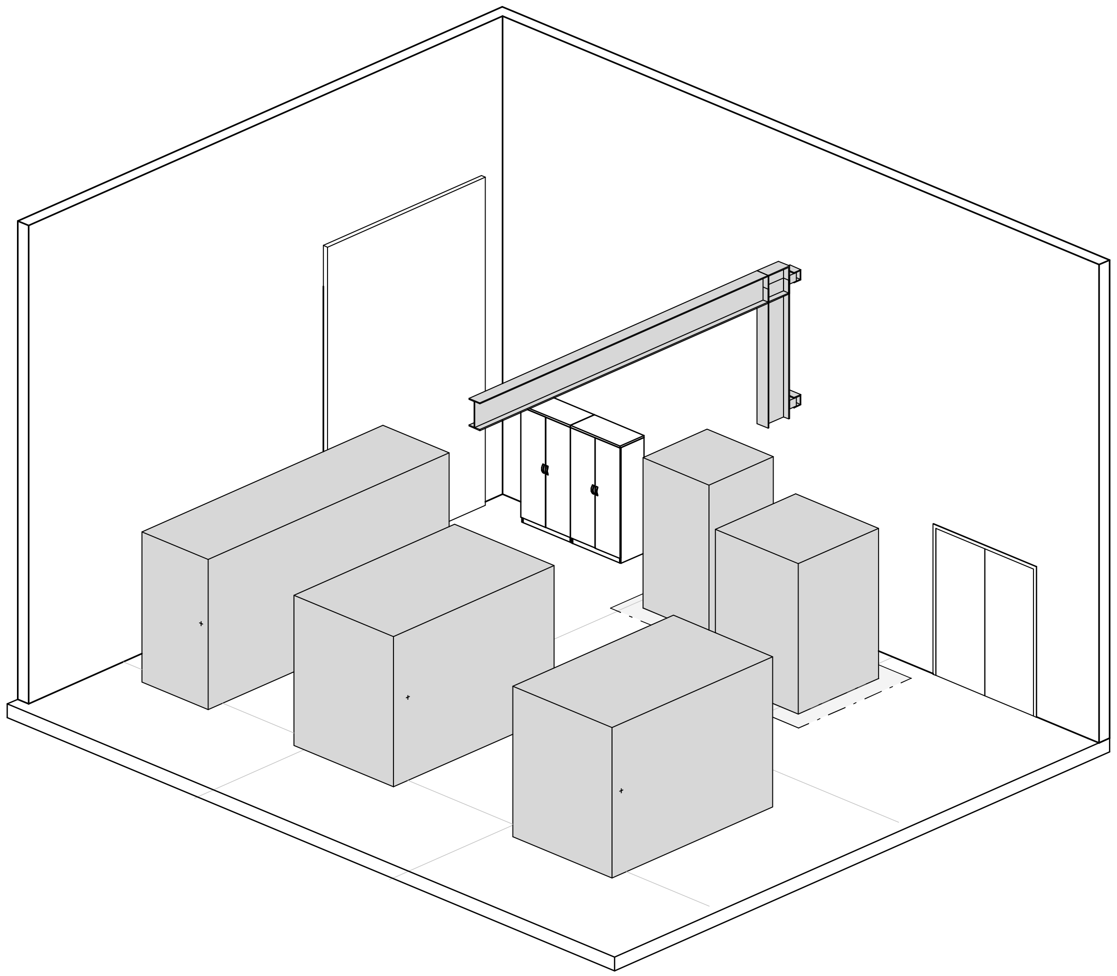
ARCHITECTURAL SYSTEMS / UTILITIES / SYSTEMS

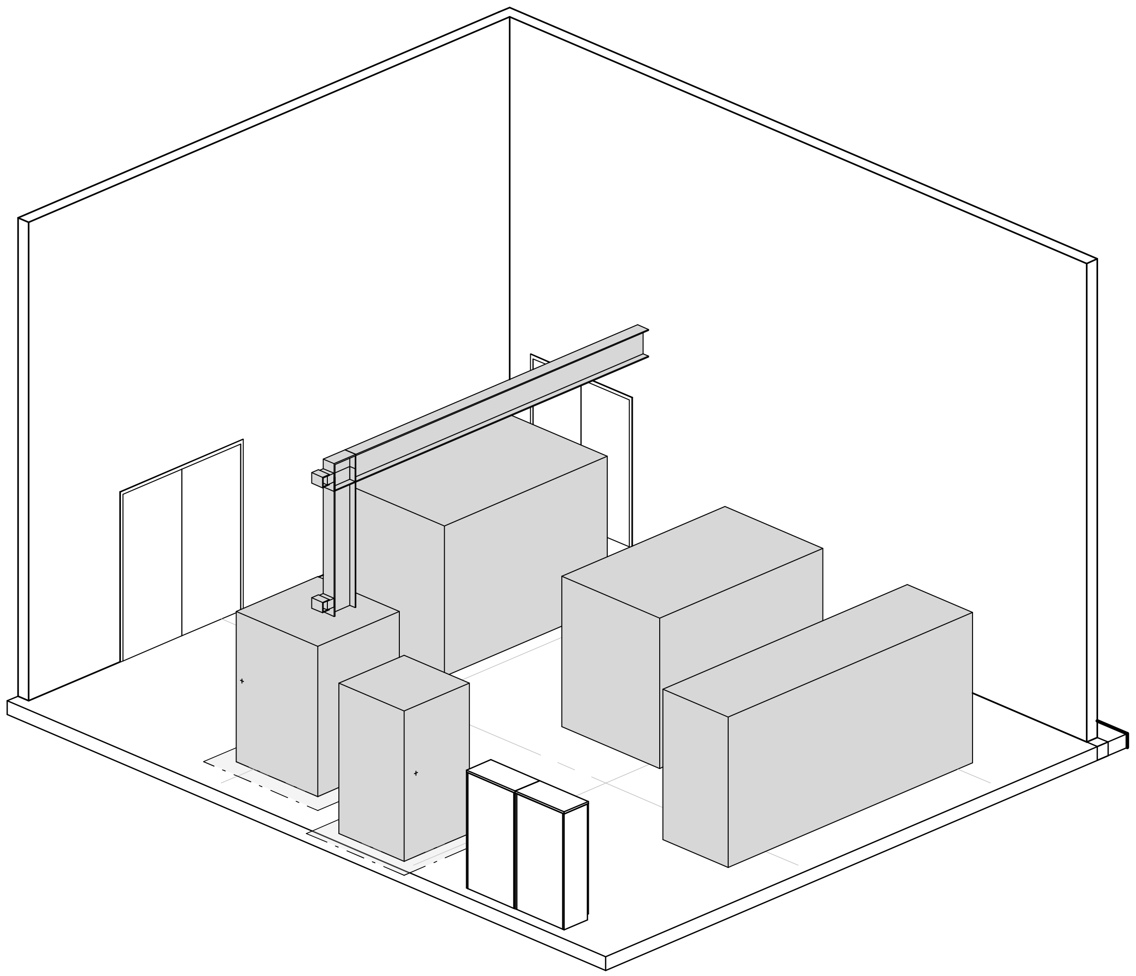
U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E71	AIR COMPRESSOR FOR HTM
E72	AIR COMPRESSOR FOR RIG
E111	AIR DRYER FOR BURNER RIG
E112	AIR RECEIVER FOR BURNER RIG
E117	AIR RECEIVER FOR TEST DEVICES SPIN RIG
E506	1t WALL MOUNTED JIB CRANE

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.1		**RDS: 036-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: SPIN AND BURNER RIG EQUIPMENT SUPPORT**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: SPIN RIG , BURNER RIGS	SECONDARY ADJACENCY	TERTIARY ADJACENCY	





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT	SPACE ID#: 4.2	**RDS-037-1**
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: N/A		AREA (m2): 77.76	**Space Name:**
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 24 HOURS	SPECIE USE: N/A	**PUMP ROOM**
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Lab support room for hydraulic pumps, requires open area to accomodate equipment.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS: EPOXY FINISH COATING

FLOOR BASE
- TYPE (OTHER-DEFINE): ________________
- INTEGRAL COVE:
- OTHER / COMMENTS: EPOXY FINISH COVE BASE UPSTAND

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: 4m
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: N/A
- CASEWORK MATERIAL: N/A
- DEPTH: N/A
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: NO
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: N/A
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 1100 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 1100 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 30ºC
- SETPOINTS (WINTER): 18ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): UNCONTROLLED
- SETPOINTS (SUMMER): UNCONTROLLED
- +/- % RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% EXHAUST
- SPECIALITY EXHAUST: DEDICATED CONTINUOUS EXHAUST
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR
- EQUIPMENT EXHAUST:
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:
- - DEDICATED EXHAUST SYSTEM

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: YES (OIL)
- TEMP:YES

PROCESS PIPING
- PROCESS WATER: YES
- STEAM: NO
- COMP. AIR: YES
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- PROCESS COOLING WATER: YES
- HYDRAULIC SUPPLY: YES

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL:
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: SINGLE POINT
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS: NO
- EFFLUENT DECONTAMINATION SYSTEM: NO
- EFFLUENT pH CONTROL: NO
- OTHER / COMMENTS:
- - CONTAINMENT STRATEGY REQUIRED TO CAPTURE HYDRAULIC OIL SPILLS (IE. DIKE)

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- **HAZARD 1**
- HYDRAULIC OIL
- **HAZARD 2**
- **HAZARD 3**

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 7.2 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: Locally reinforce for equipment (~50 kN) where required
- 1.0 t overhead crane

ELECTRICAL / POWER

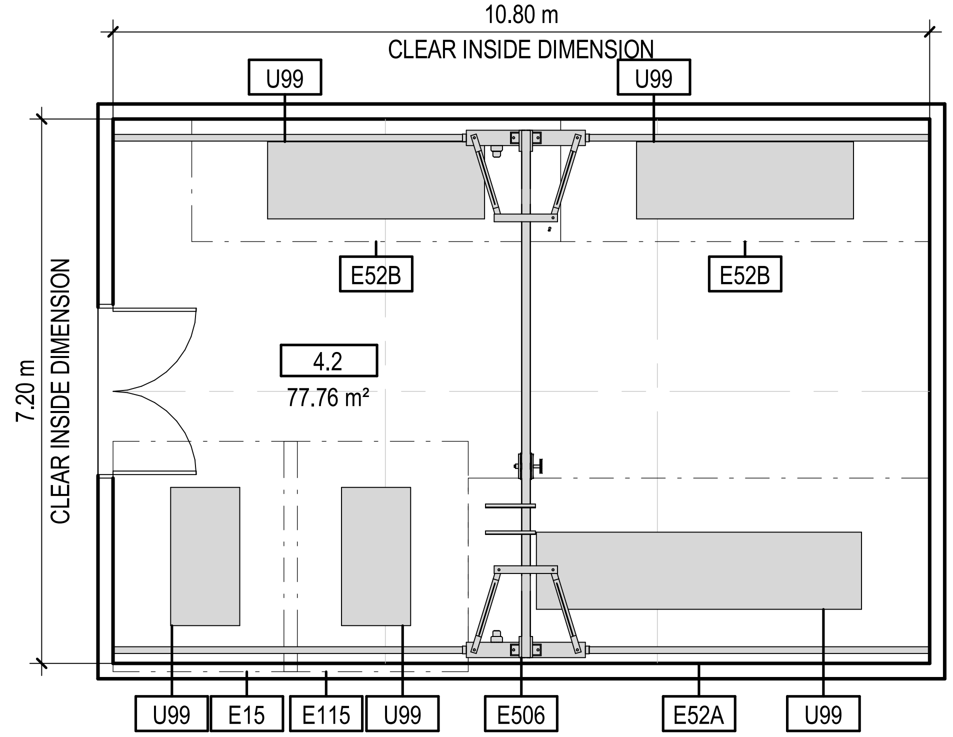
- CLASS TYPE: NORMAL + UPS
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH 480V/ XXX / 3PH
- VOLTAGE / CURRENT / PH 2: 600V / XXX / 3 PH
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- CONNECTIONS TO PUMP CONTROLLER

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION: NO
- PUBLIC PAGING:N/A
- INTERCOM: NO
- DATA TYPE / POINTS:
- DATA PLUG SPACING:
- WIRELESS: NO
- CABLE TRAY TYPE: N/A
- OTHER / COMMENTS:
- DATA CONNECTIONS TO PUMP CONTROLLERS?

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.2	**RDS: 037-2**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT		**SPACE NAME: PUMP ROOM**
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 24 HOURS	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MATERIAL AND COMPONENT TESTING NRC HIGH BAY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



1 — 037-2

4.2 - PUMP ROOM

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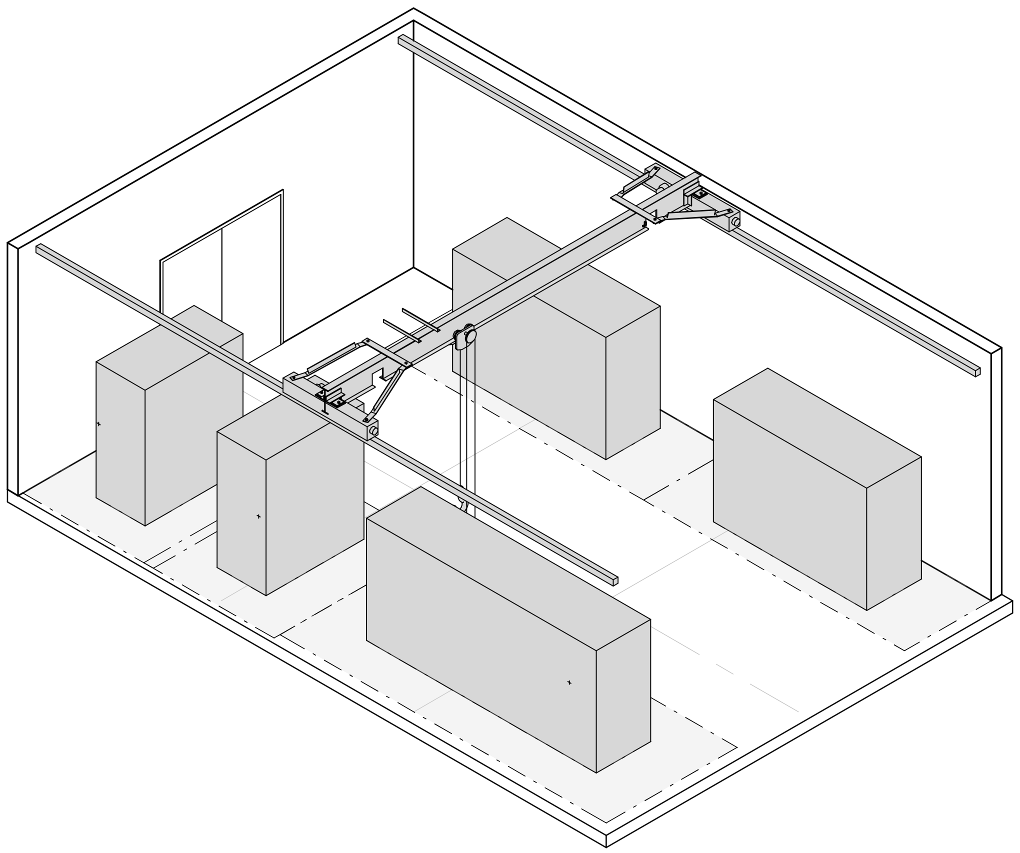
LEGEND

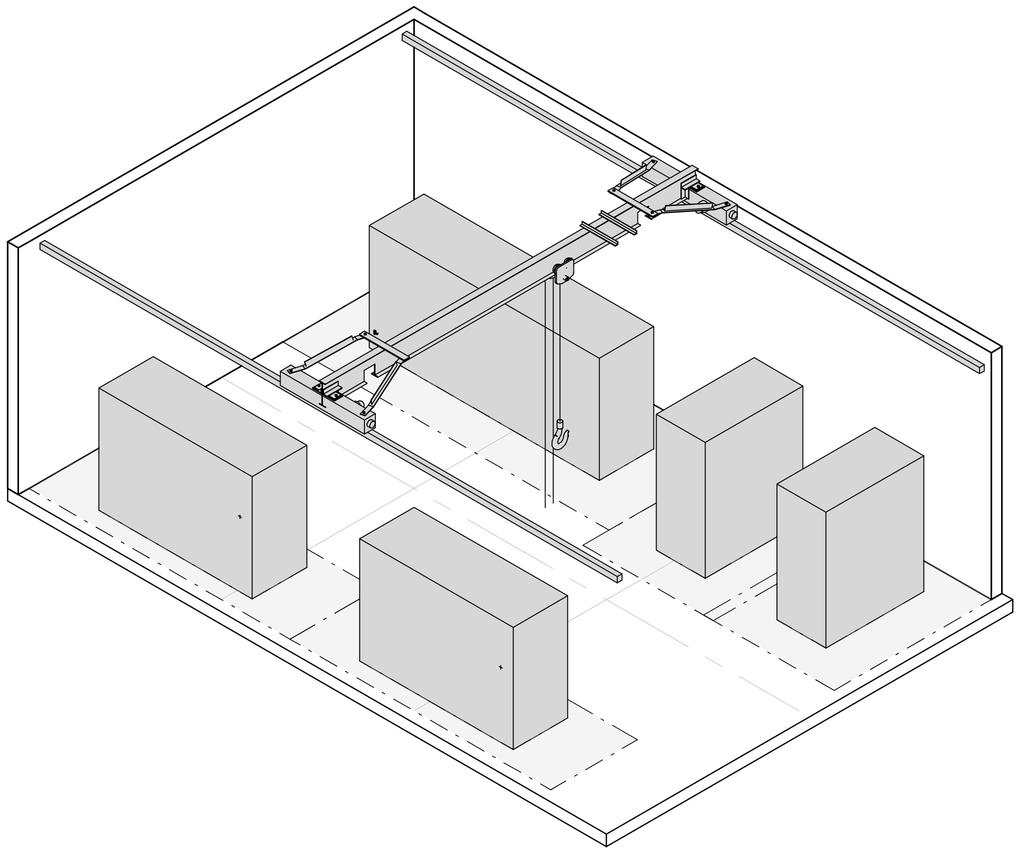
ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
		U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E15	HYDRAULIC POWER UNIT - MODEL 505.30		
E52A	MTS MOD 515.150 HYDRAULIC PUMP		
E52B	MTS MOD 515.90 HYDRAULIC PUMP		
E115	HYDRAULIC POWER UNIT - MODEL 515.30		
E506	1t OVERHEAD CRANE		

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.2	**RDS: 037-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT		**SPACE NAME: PUMP ROOM**
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 24 HOURS	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MATERIAL AND COMPONENT TESTING NRC HIGH BAY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LAB SUPPORT	SPACE ID#: 4.3	RDS-038-1
CHIEF SCIENTIST: Martin Breton & Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 21.64	Space Name: SEM LAB SUPPORT ROOM
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 7AM-5PM	SPECIE USE: N/A	
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES: Support activities of the scanning electron microscope (SEM) laboratory.			

ARCHITECTURAL

FLOOR FINISH
- TYPE: SHEET VINYL
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: SHEET VINYL
- INTEGRAL COVE: YES
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: 5/8" GYP.
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE:
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER / COMMENTS:

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 1% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: YES
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- PROCESS COOLING: YES
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: SINGLE POINT
- TRAP DEPTH: 75mm OR 100mm
- MATERIAL: CARBON STEEL
- HEPA FILTERED PLUMBING VENTS: NO
- EFFLUENT DECONTAMINATION SYSTEM: NO
- EFFLUENT pH CONTROL: NO
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):

HAZARD 1
- CHEMICAL - COMBUSTIBLE LIQUIDS (VACCUM OILS)

HAZARD 2

HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 4.8 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

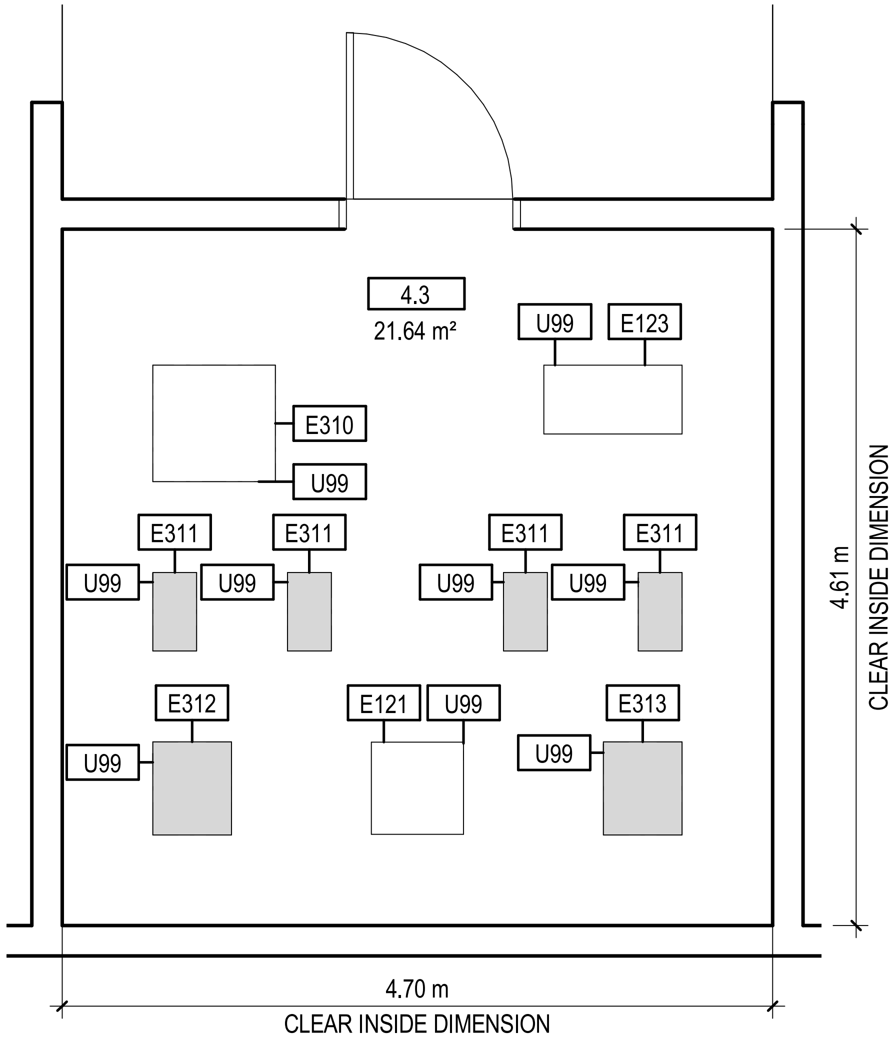
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:
- CONNECTIONS TO SPECIALTY EQUIPMENT

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION:
- PUBLIC PAGING:N/A
- INTERCOM:
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: NO
- CABLE TRAY TYPE:
- OTHER / COMMENTS:
- CONNECTIONS TO SPECIALTY EQUIPMENT

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.3	RDS: 038-2
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LAB SUPPORT	LAB CERTIFICATION REQUIREMENTS:	SPACE NAME: SEM LAB SUPPORT
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY SEM LABS — SECONDARY ADJACENCY SEM PREP ROOM — TERTIARY ADJACENCY		



1 / 038-2 **4.3 - SEM LAB SUPPORT**
1 : 50

LEGEND

ARCHITECTURAL SYSTEMS

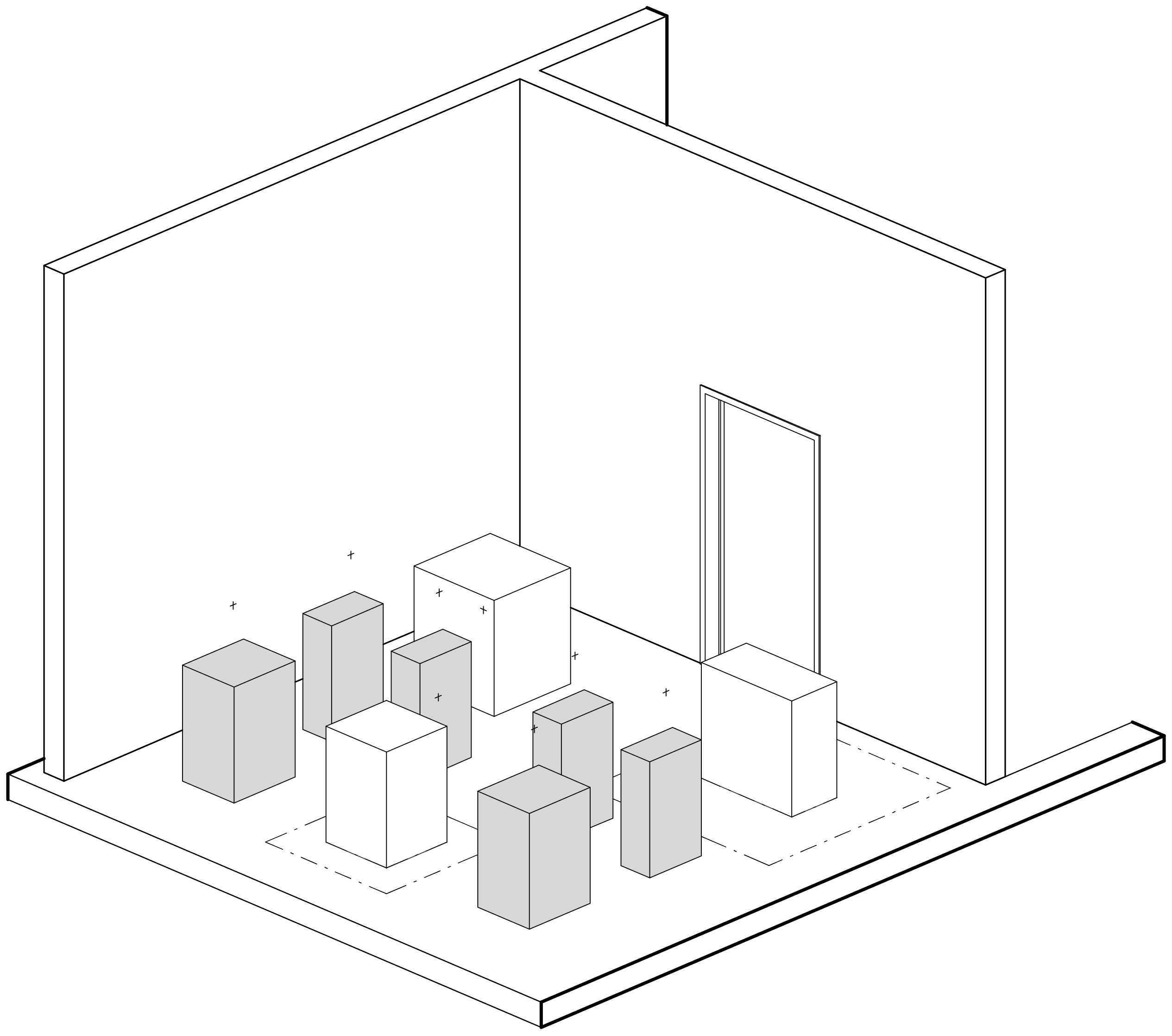
UTILITIES / SYSTEMS

U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E121	WATER CHILLER, LIQUID/LIQUIDSYSTEM
E123	UPS UNIT, EATON
E310	UPS 1
E311	PVP
E312	SEM CHILLER 1
E313	SEM CHILLER 2

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.3		**RDS: 038-3**
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LAB SUPPORT	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: SEM LAB SUPPORT**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY SEM LABS — SECONDARY ADJACENCY SEM PREP ROOM — TERTIARY ADJACENCY			



REVISION # & ISSUE DATE: REV 8, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB ENGINEERING LAB	SPACE TYPE: LAB SUPPORT	SPACE ID#: 4.4	RDS-039-1
CHIEF SCIENTIST: Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 29.16	Space Name: BATTERY STORAGE ROOM
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS: N/A	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES: Stand alone battery storage facility to support TSB activities. Purpose is for safe storage of large and/or multiple battery packs. Requires reinforced concrete walls (due to explosion risk), proper venting (due to off-gas), temp. control/monitoring, fire suppression, fork lift entry & blow out doors.			

ARCHITECTURAL

FLOOR FINISH
TYPE: SHEET VINYL
SLIP RESISTANCE:
ANTI-STATIC RESISTANCE: NOT REQUIRED
OTHER / COMMENTS:
PREFERRED VENDOR(S):

FLOOR BASE
TYPE: SHEET VINYL
INTEGRAL COVE: YES
OTHER / COMMENTS:
PREFERRED VENDOR(S):

WALL TYPE / CONSTRUCTION
WALL TYPE: CONCRETE
SHIELDING:
IMPACT RESISTANT: NO
WATER RESISTANT: NO
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE:
WALL FINISH: PAINT
OTHER / COMMENTS:
PREFERRED VENDOR(S):

CEILING
CEILING TYPE: TILE CEILING (HUNG)
HEIGHT: 4m
FINISH: ACOUSTIC TILE
ACOUSTIC PERFORMANCE: STC 50
PRESSURE PERFORMANCE:
OTHER / COMMENTS:
PREFERRED VENDOR(S):

SPECIAL DESIGN CONSIDERATIONS
GASEOUS DECONTAMINATION:
SURFACE DECONTAMINATION:
FIRE EXTINGUISHER CABINET: YES
CRANE SUPPORT: N/A
ELECTROMAGNETIC SHIELDING:
PENETRATION SEALING:
OTHER / COMMENTS:

CASEWORK / MILLWORK
CASEWORK SYSTEM: N/A
CASEWORK MATERIAL: N/A
DEPTH: N/A
UPPER CABINETS: N/A
HEIGHT ADJUSTABLE: NO
BASE CABINETS: N/A
COUNTERTOP MATERIAL: N/A
OTHER / COMMENTS:
PREFERRED VENDOR(S):
CHEMICAL STORAGE:
ACID:
BASE:
FLAMMABLE LIQUIDS:
STORAGE CABINET: NO
STORAGE DRAWER UNIT: NO
SHIELDED STORAGE UNIT: NO
OVERHEAD SERVICE CARRIER: NO
OTHER / COMMENTS:
PREFERRED VENDOR(S):

WINDOWS / DAYLIGHTING
NATURAL LIGHT: NOT REQUIRED
WINDOWS:
OPERABLE:
SAFETY GLAZING:
SAFETY ETCHING:
SHADE CONTROL:
OTHER / COMMENTS:
PREFERRED VENDOR(S):

DOORS/ HARDWARES
DOOR TYPE: SINGLE
PRIMARY LEAF: 1100 mm X 2150 mm
SECONDARY LEAF (IF APPLICABLE):
VISION PANEL: PRIMARY LEAF
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:
PREFERRED VENDOR(S):

DOOR TYPE: OVERHEAD DOOR
PRIMARY LEAF: 3000mm x 4200mm
SECONDARY LEAF (IF APPLICABLE):
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:
PREFERRED VENDOR(S):

DOOR TYPE:
PRIMARY LEAF:
SECONDARY LEAF (IF APPLCABLE):
VISION PANEL:
LOCKSET TYPE:
ARMOUR PLATE:
KICK PLATE
ACCESS CONTROL:
DOOR INTERLOCK: (IF APPLICABLE)
INDICATOR: (IF APPLICABLE)
DOOR BUMPERS:
DOOR JAMB GUARDS:
OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE

PRIMARY CONTAINMENT DEVICE:
PRIMARY CONTAINMENT DEVICE:
OTHER / COMMENTS:
PREFERRED VENDOR(S):

ACCESSIBLITY REQUIREMENTS

ACCESSIBILITY ELEMENT 1:
ACCESSIBILITY ELEMENT 2:
ACCESSIBILITY ELEMENT 3:
ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS

SPACE REQUIRED FOR RECYCLING BIN (m^2):
SPACE REQUIRED FOR COMPOSTING BIN (m2):
UNOCCUPIED PERIOD TEMP. SET BACK:
TEMPERATURE SET BACK MAXIMUM (ºC):
TEMPERATURE SET BACK MINIMUM (ºC):
INDIVIDUAL TEMPERATURE CONTROL:
OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
SETPOINTS (SUMMER): 25ºC
SETPOINTS (WINTER): 21ºC
+/- 1ºC

CONTROLS
CONTROLS TYPE: ALL DIGITAL
CONTROLS FRAMEWORK: BACNet OVER IP
OTHER / COMMENTS:
UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
STATS: ZONE
SETPOINTS (SUMMER): 50% RH
SETPOINTS (WINTER): 30% RH
+/- 5% RH
TRIM HUMIDIFICATION: NO

VENTILATION
AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
ROOM FILTRATION - EXHAUST: NONE
ROOM FILTRATION - SUPPLY: NONE
AIR CIRCULATION METHOD: 100% SUPPLY
SPECIALITY EXHAUST: CANOPY HOOD EXHAUST
DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
DIRECTIONAL AIRFLOW METHOD: FORCED
PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
ROOM ISOLATION DAMPERS: NONE
FILTRATION TYPE: N/A
PRESSURE AIRFLOW INDICATOR: NONE
EQUIPMENT EXHAUST:
MECHANICAL NOISE (DECIBELS / NC): NC50
COMMENTS:

MONITORING AND ALARMS
PRESSURE / AIRFLOW INDICATOR: NO
EQUIPMENT MONITORING POINTS: NO
HVAC ALARM RELATIVE PRESSURIZATION: NO
ANIMAL ROOM MONITORING SYSTEM: NO
GAS DETECTION: YES
LIQUID / LEAK DETECTION: NO
TEMP / HUMIDITY: YES
COMMENTS:

PROCESS PIPING
PROCESS WATER: NO
STEAM: NO
COMP. AIR: NO
BREATHING AIR: NO
ANIMAL WATER: NO
PURIFIED WATER: NO
OTHER PROCESS FLUIDS:
OTHER PROCESS FLUIDS:

GASES
SUPPLY SYSTEM TYPE:
GAS TYPES:

PLUMBING

FIXTURES
SINK TYPES: N/A
SINK DEPTH:
SINK COUNTS:
SINK DIMENSIONS:
INTEGRAL TO CASEWORK / BENCHTOP:
PEGBOARD:
FAUCET TYPE: N/A
PIPING MATERIAL:
SIZE DIAMETER:
VENT SIZE DIAMETER:
SAFETY EMERGENCY SHOWER ANSI 358.1: NO
CORROSIVE MATERIAL: NO
SAFETY EMERGENCY EYEWASH ANSI 358.1: NO
OTHER:

DRAINS / VENTS
FLOOR DRAIN: N/A
TRAP DEPTH (mm):
MATERIAL
HEPA FILTERED PLUMBING VENTS:
EFFLUENT DECONTAMINATION SYSTEM:
EFFLUENT pH CONTROL:
OTHER / COMMENTS:

FIRE PROTECTION / ALARM

HAZARD CLASS:
SPRINKLER SYSTEM: YES
SPRINKLER SYSTEM TYPE: WET PIPE
FIRE DETECTION: NORMAL (TO CODE)
ALARM METHOD: NORMAL
OTHER / COMMENTS:

HAZARDS

BUILDING HAZARD CLASS (NBC / NSF):
HAZARD 1
CHEMICAL
HAZARD 2
HAZARD 3

STRUCTURAL

STRUCTURAL DESIGN IMPLICATIONS:
ROLLING LOAD LIMITS:
VIBRATION CRITERA:
FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICATIONS (LIVE): 12 kPa
STRUCTURAL SHIELD REQUIREMENT:
CEILING LOADING:
SPECIAL PENETRATIONS:
OTHER / COMMENTS: Pressure relief panel in exterior wall

ELECTRICAL / POWER

CLASS TYPE: NORMAL
VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
VOLTAGE / CURRENT / PH 2:
SPECIAL NEMA PLUG ARRANGEMENT:
POWER DENSITY:
OVERHEAD SERVICE CARRIER: N/A
ISOLATED GROUNDING: N/A
GROUND FAULT PROTECTION: N/A
WEATHER PROOF COVER: N/A
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
TYPE IP RATING HERE:
RACEWAY: N/A
PLUG SPACING:
FLOOR BOX W TRENCH: NO
OTHER / COMMENTS:
EXPLOSION PROOF DEVICES

LIGHTING

SPECIALIZED LIGHTING: NO
SPECIALIZED CONTROL: NO
MOUNT: RECESSED CEILING
FIXTURE OUTPUT: DIRECT
LIGHT LEVEL (LUX):
LIGHT COLOUR TEMP (KELVIN): 4000
DIMMING SYSTEM: NO
WHITE TUNING:
TASK LIGHTING: NO
SCENE/ZONE CONTROL: NO
OCCUPANCY SENSORS: YES
NIGHT LIGHT: NO
DAYLIGHT CONTROL: NO
IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
SAFETY LIGHTS: NO
A/V EQUIPMENT INTERFACE: NO
OTHER / COMMENTS:

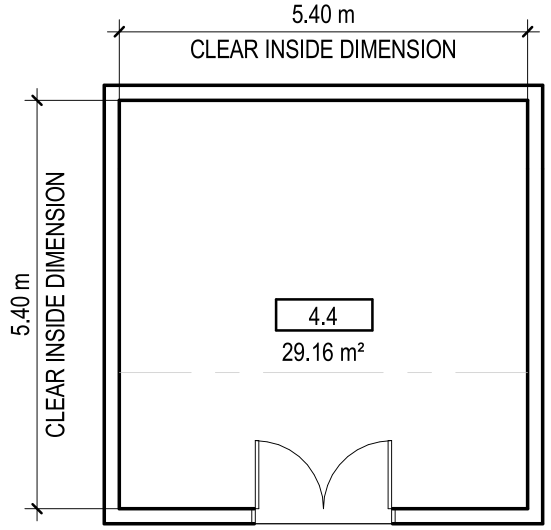
COMMUNICATIONS

PHONE: N/A
CELLULAR COMMUNICATION:
PUBLIC PAGING:N/A
INTERCOM: NO
DATA TYPE / POINTS: COPPER RJ45
DATA PLUG SPACING:
WIRELESS: NO
CABLE TRAY TYPE:
OTHER / COMMENTS:

SECURITY

CONNECTION TO CENTRAL MONITORING STATION:
CCTV:
EMERGENCY DISTRESS CALL:
FAIL-SAFE HARDWARE:
INTRUDER SYSTEM:
ACCESS CONTROL (OPTIONS BELOW)
-
-
-
-
SECURITY EQUIPMENT:
SECURITY ZONES:
OTHER / COMMENTS:
Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 8, 20/05/2021		SPACE ID #: 4.4	**RDS: 039-2**
DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LAB SUPPORT		**SPACE NAME: BATTERY STORAGE ROOM**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: OUTDOOR AREA — SECONDARY ADJACENCY: TSB HIGH BAY — TERTIARY ADJACENCY		



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039-2

4.4 - BATTERY STORAGE ROOM

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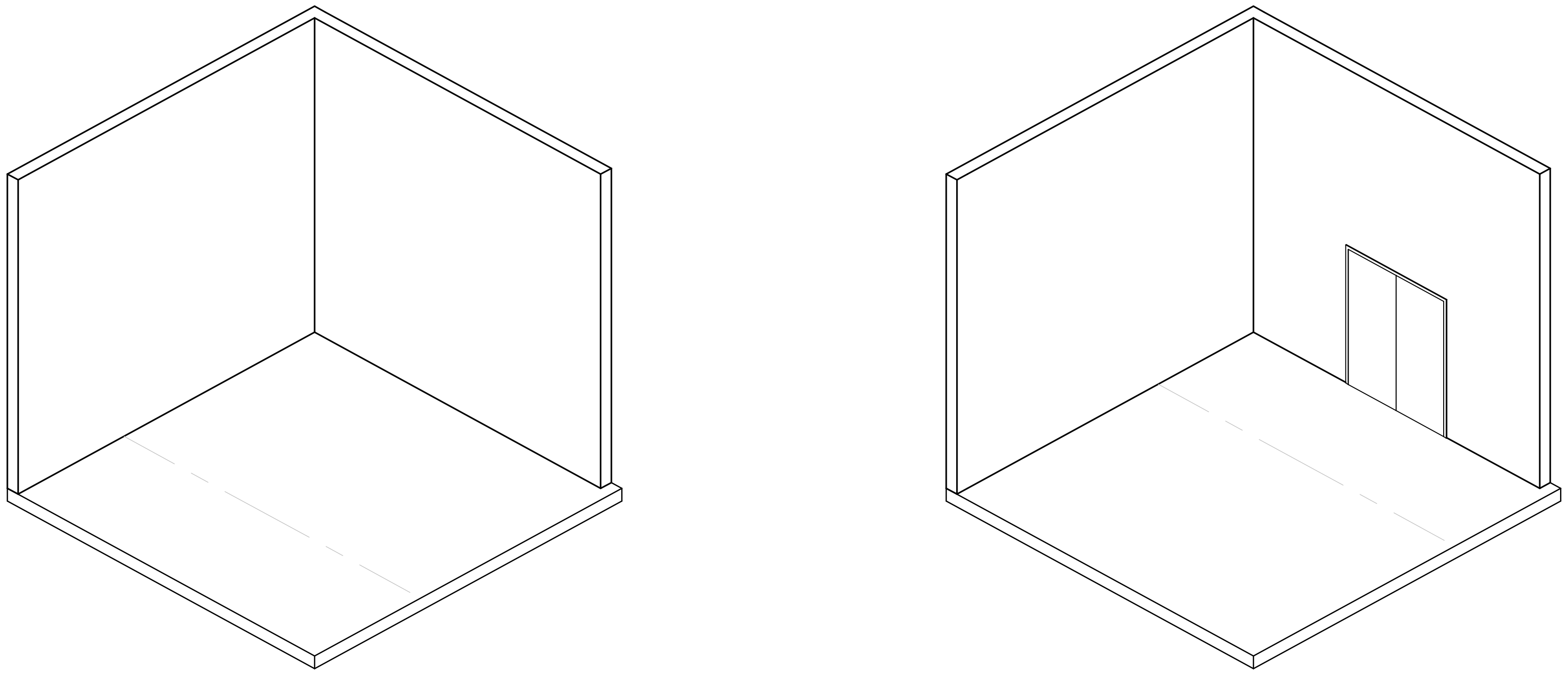
LEGEND

ARCHITECTURAL SYSTEMS	UTILITIES / SYSTEMS

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 8, 20/05/2021		SPACE ID #: 4.4		**RDS: 039-3**
DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LAB SUPPORT	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: BATTERY STORAGE ROOM**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: OUTDOOR AREA — SECONDARY ADJACENCY: TSB HIGH BAY — TERTIARY ADJACENCY			



REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB ENGINEERING LAB	SPACE TYPE: LAB SUPPORT	SPACE ID#: 4.5	RDS-040-1
CHIEF SCIENTIST: Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 77.76	Space Name: WRECKAGE STORAGE
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 7AM-530PM	SPECIE USE: N/A	
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Room for temporary wreckage storage for up to 2 years while an investigation is underway. Wreckage typically starts off in the High Bay Lab for 3 to 9 months before it is moved to the wreckage storage room. Requires open area with storage shelving.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE: NOT REQUIRED
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE: YES
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPRACT RESISTANT: YES
- WATER RESISTANT: NO
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: 4m
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: N/A
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: NO
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: N/A
- OTHER / COMMENTS: STORAGE SHELVING, MOBILE SHELVING
- PREFERRED VENDOR(S):
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS: NO
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLICABLE): 900 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):
- DOOR TYPE: OVERHEAD DOOR
- PRIMARY LEAF: 3000 mm x 4200 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST:
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQUIPMENT EXHAUST:
- MECHANICAL NOISE (DECIBELS / NC): NC50
- COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: YES
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES:

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE: N/A
- PIPING MATERIAL:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO
- OTHER:

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH (mm):
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM:
- EFFLUENT pH CONTROL:
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- CHEMICAL - TRACE
- HAZARD 2
- RADIATION - VERY LOW AIRCRAFT INSTRUMENTATION
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 7.2 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

ELECTRICAL / POWER

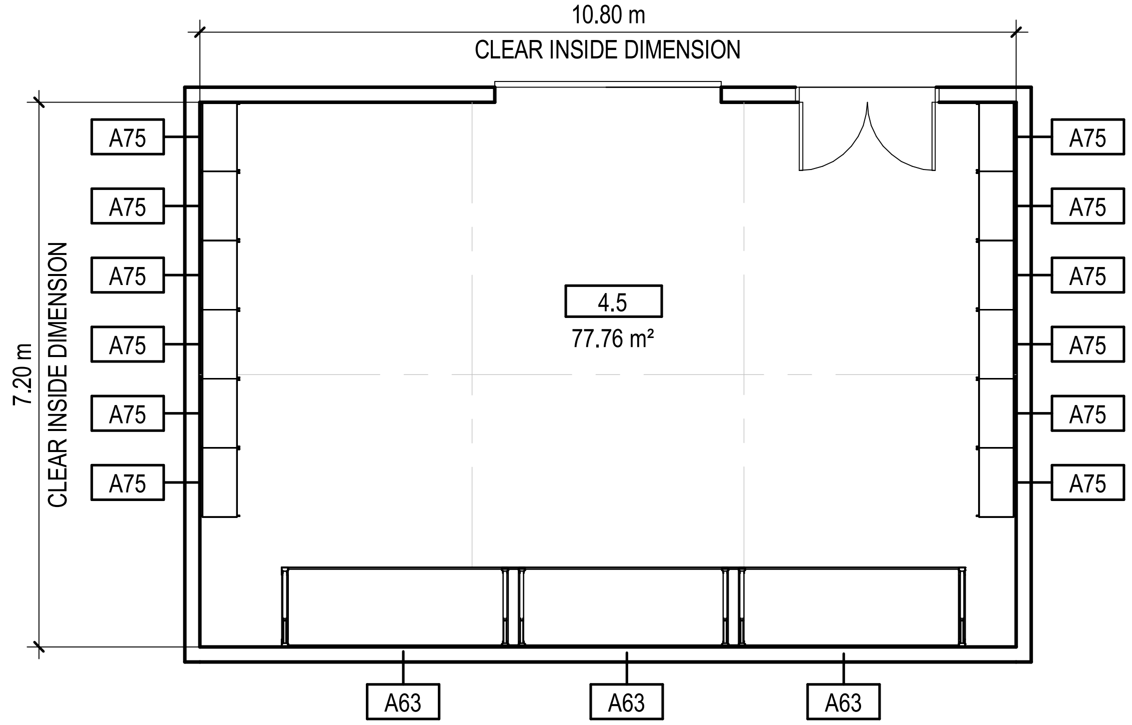
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM: NO
- DATA TYPE / POINTS: N/A
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 4.5	RDS: 040-2
DEPARTMENTS / GROUP NAME: TSB ENGINEERING LAB	SPACE TYPE: LAB SUPPORT		SPACE NAME: WRECKAGE STORAGE
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-530PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY TSB HIGH BAY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



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4.5 - WRECKAGE STORAGE

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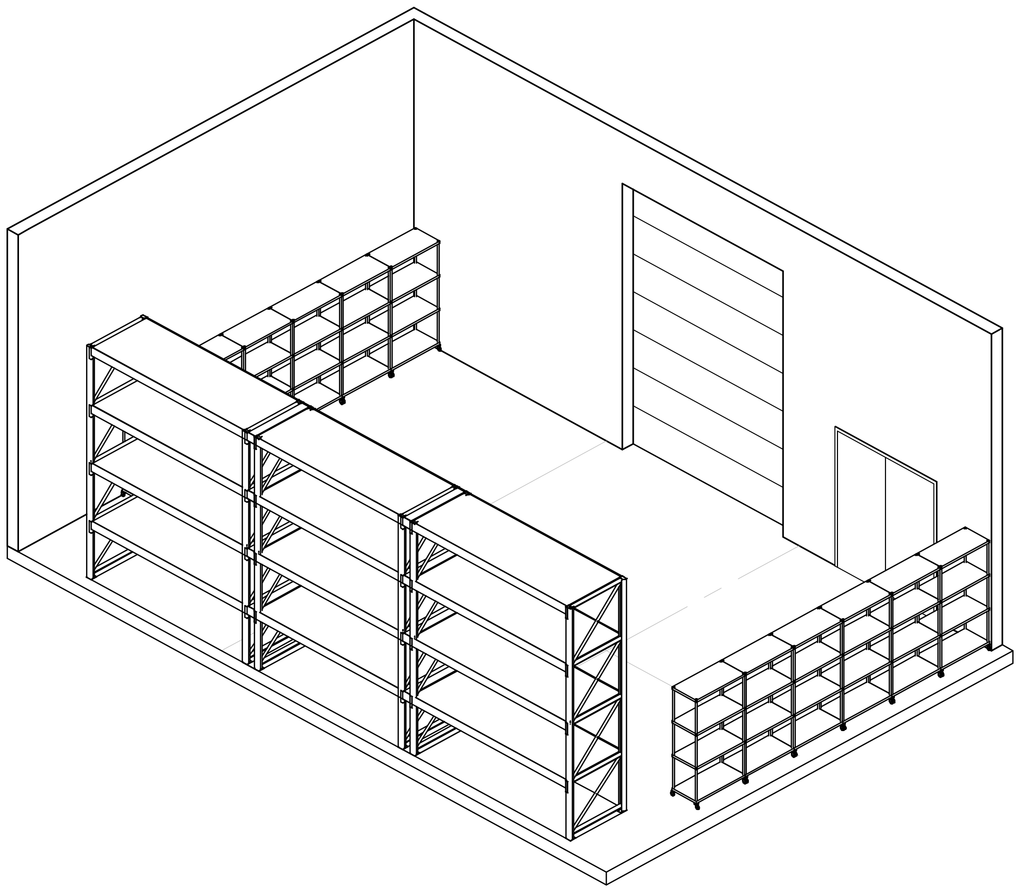
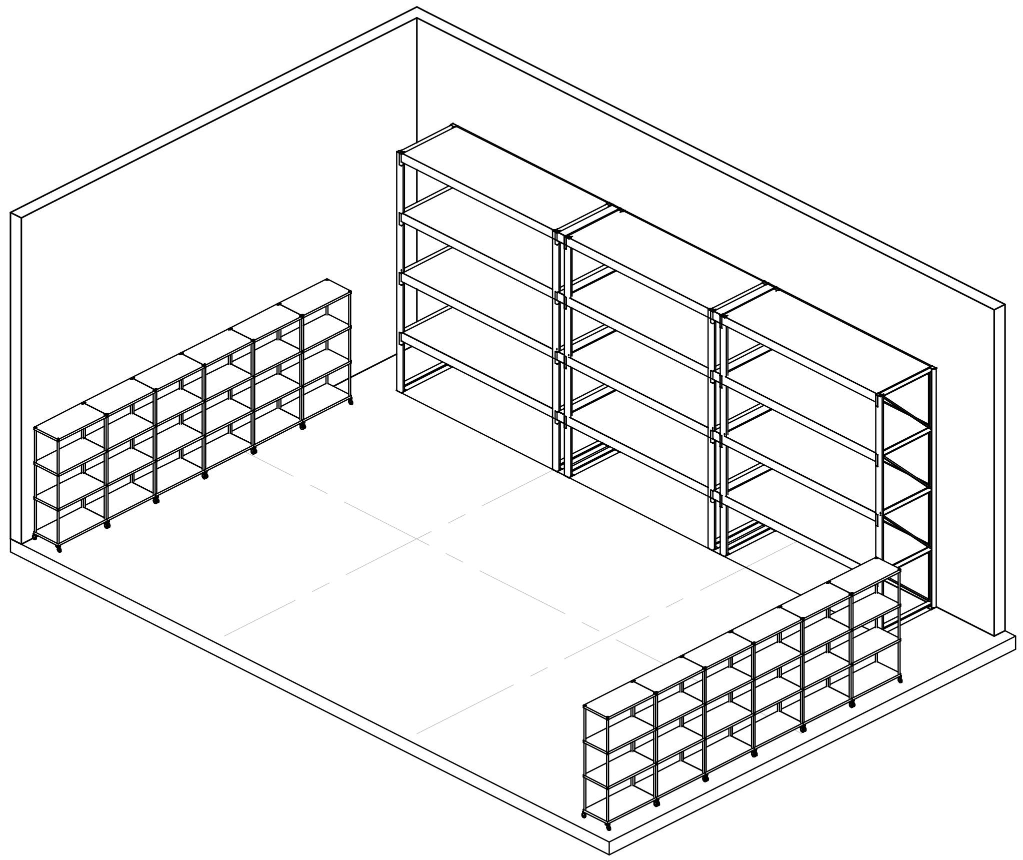
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A63	STORAGE SHELVING, INDUSTRIAL		
A75	MOBILE SHELVING		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 4.5		**RDS: 040-3**
DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LAB SUPPORT			**SPACE NAME: WRECKAGE STORAGE**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-530PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY TSB HIGH BAY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT	SPACE ID#: 4.6	RDS-041-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 90.72	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	FULL SCALE TESTING EQUIPMENT STORAGE
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Requires open area with shelving to accommodate equipment storage.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE:
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m²):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: 4m
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: F-FRAME
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: 1m
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: NO
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: N/A
- OTHER / COMMENTS: STORAGE SHELVING
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLICABLE): 900 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TMIE TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD: NO
- FAUCET TYPE: N/A
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL:
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 7.2 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

ELECTRICAL / POWER

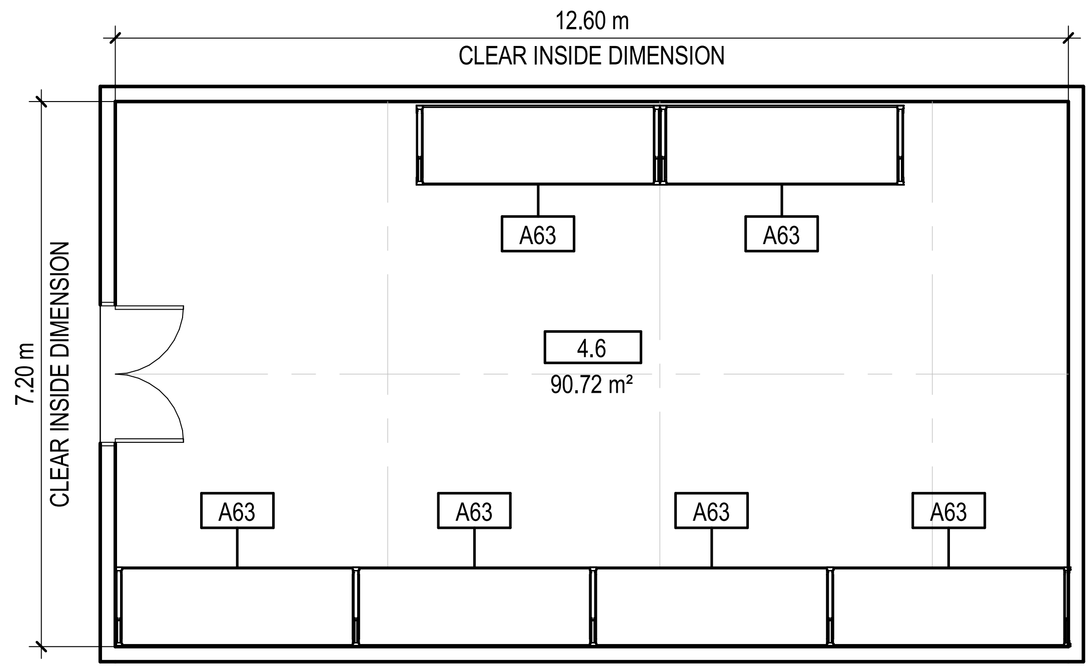
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: N/A
- OTHER / COMMENTS:
- EPO REQUIRED, WIREMOLD ABOVE WORKBENCHES, 3 IN
- FLOOR TRENCHES C/W POWER & DATA, REMOVABLE COVER

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION: NO
- PUBLIC PAGING:N/A
- INTERCOM: NO
- DATA TYPE / POINTS: N/A
- DATA PLUG SPACING:
- WIRELESS: NO
- CABLE TRAY TYPE: N/A
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.6	RDS: 041-2
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT		SPACE NAME: FULL SCALE TESTING EQUIPMENT STORAGE
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: NRC HIGH BAY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



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041-2

4.6 - FULL SCALE TESTING EQUIPMENT STORAGE

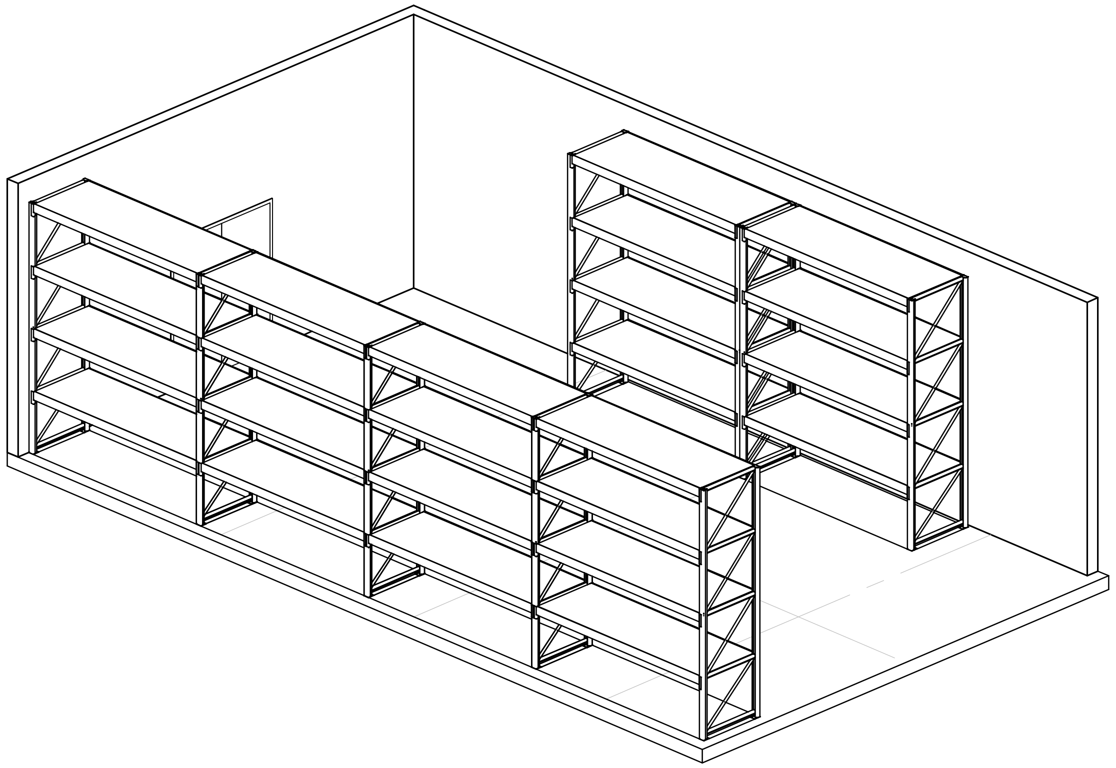
1 : 100

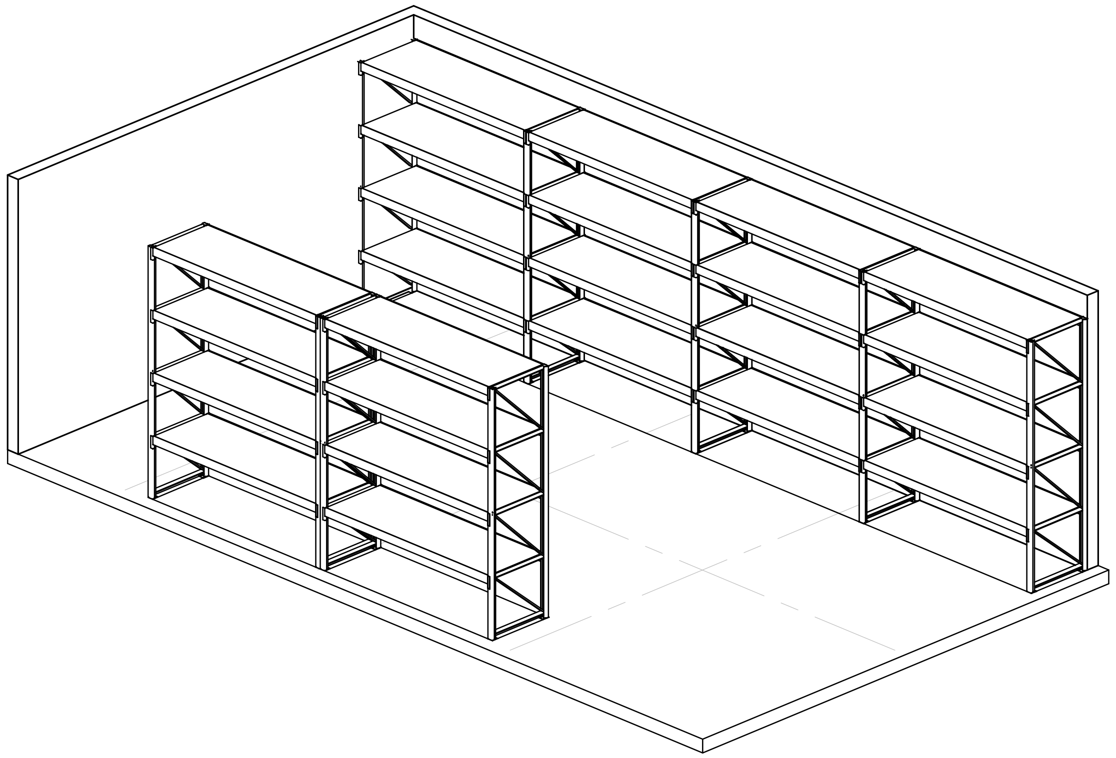
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A63	STORAGE SHELVING, INDUSTRIAL		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE:	REV 6, 20/05/2021	SPACE ID #: 4.6		RDS: 041-3
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT	LAB CERTIFICATION REQUIREMENTS:		SPACE NAME: FULL SCALE TESTING EQUIPMENT STORAGE
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY NRC HIGH BAY	SECONDARY ADJACENCY	TERTIARY ADJACENCY	





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LAB SUPPORT	SPACE ID#: 4.7	RDS-042-1
CHIEF SCIENTIST: Martin Breton & Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 25.92	Space Name: NDE EQUIPMENT STORAGE
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	STORAGE SPACE TO SUPPORT THE NON DESTRUCTIVE EVALUATION PROGRAM. INCLUDES OPEN SHELVING AND MOBILE STORAGE UNITS.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE:
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: 5/8" GYP.
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: TO STRUCTURE
- FINISH: (IF APPLICABLE)
- ACOUSTIC PERFORMANCE:
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM:
- CASEWORK MATERIAL:
- DEPTH:
- UPPER CABINETS:
- HEIGHT ADJUSTABLE:
- BASE CABINETS:
- COUNTERTOP MATERIAL:
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET:
- STORAGE DRAWER UNIT:
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS: NO
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: SINGLE + HALF
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 600 mm x 2150 mm
- VISION PANEL: N/A
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC
- OTHER/COMMENTS:

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC45
- OTHER / COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: NO

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 7.2 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

ELECTRICAL / POWER

- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:

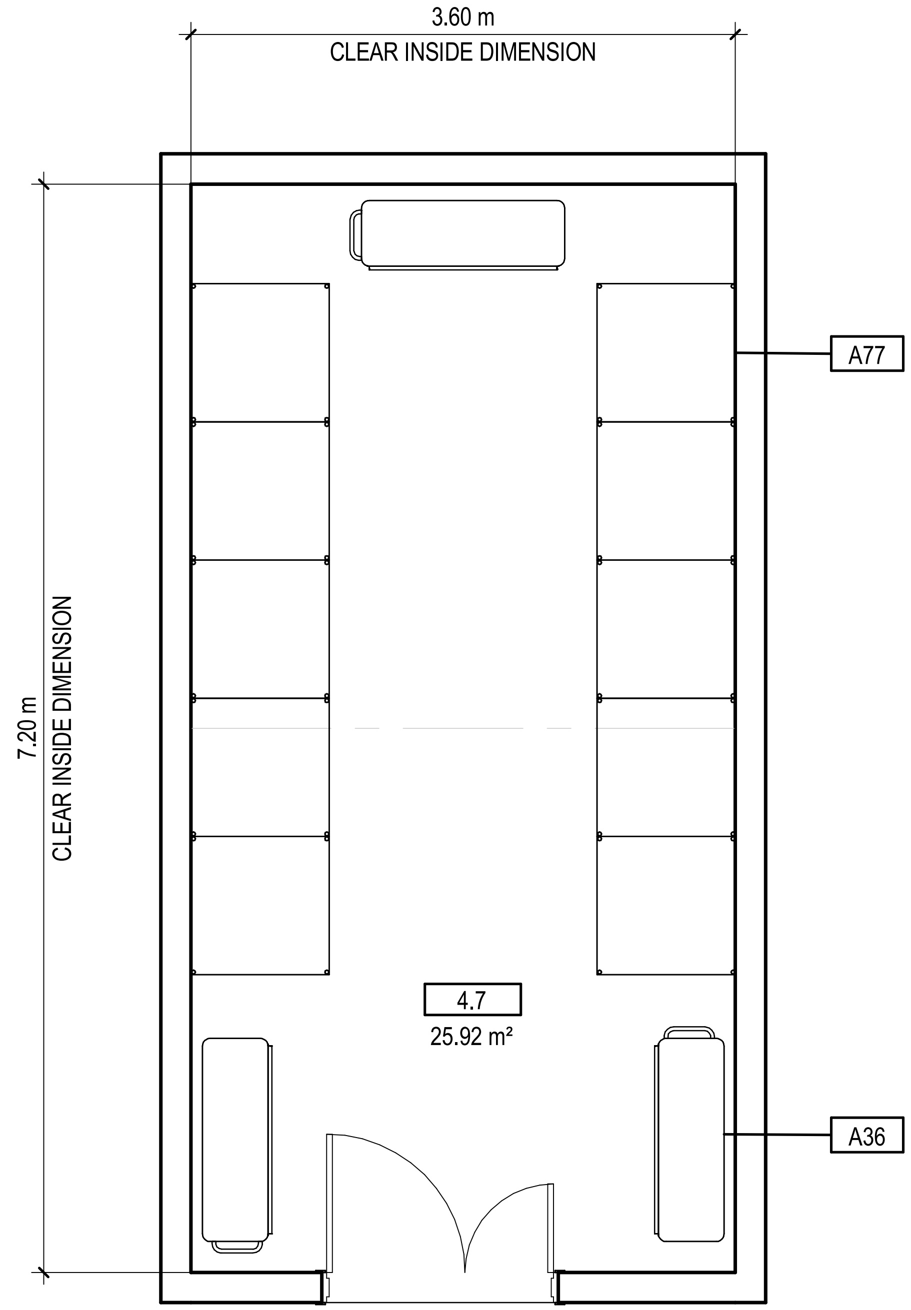
LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION:
- PUBLIC PAGING:N/A
- INTERCOM: NO
- DATA TYPE / POINTS: N/A
- DATA PLUG SPACING:
- WIRELESS: NO
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:

Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.7	RDS: 042-2
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LAB SUPPORT		SPACE NAME: NDE EQUIPMENT STORAGE
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: NON DESTRUCTIVE EVALUATION — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



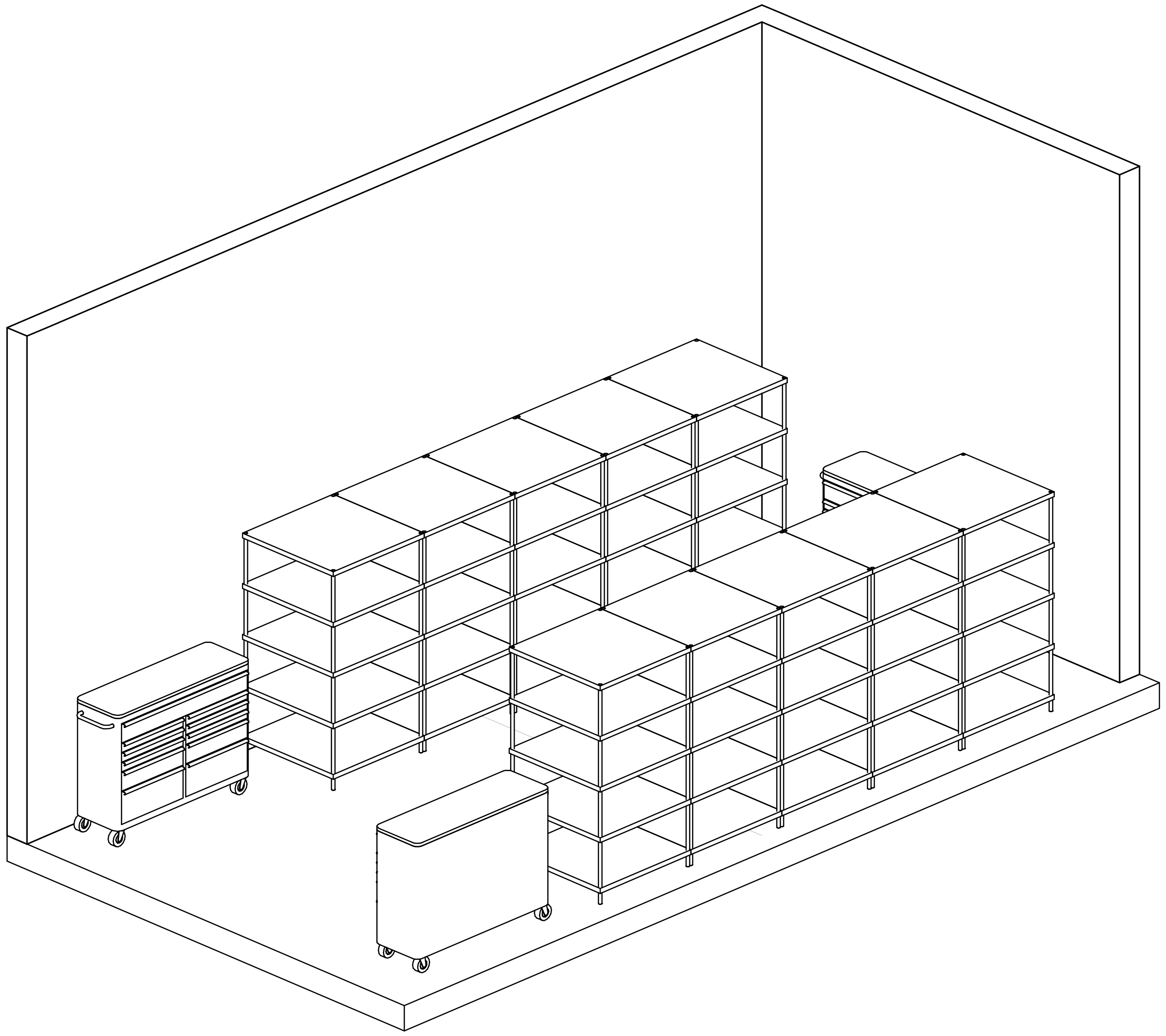
1 042-2 **4.7 - NDE EQUIPMENT STORAGE** 1 : 50

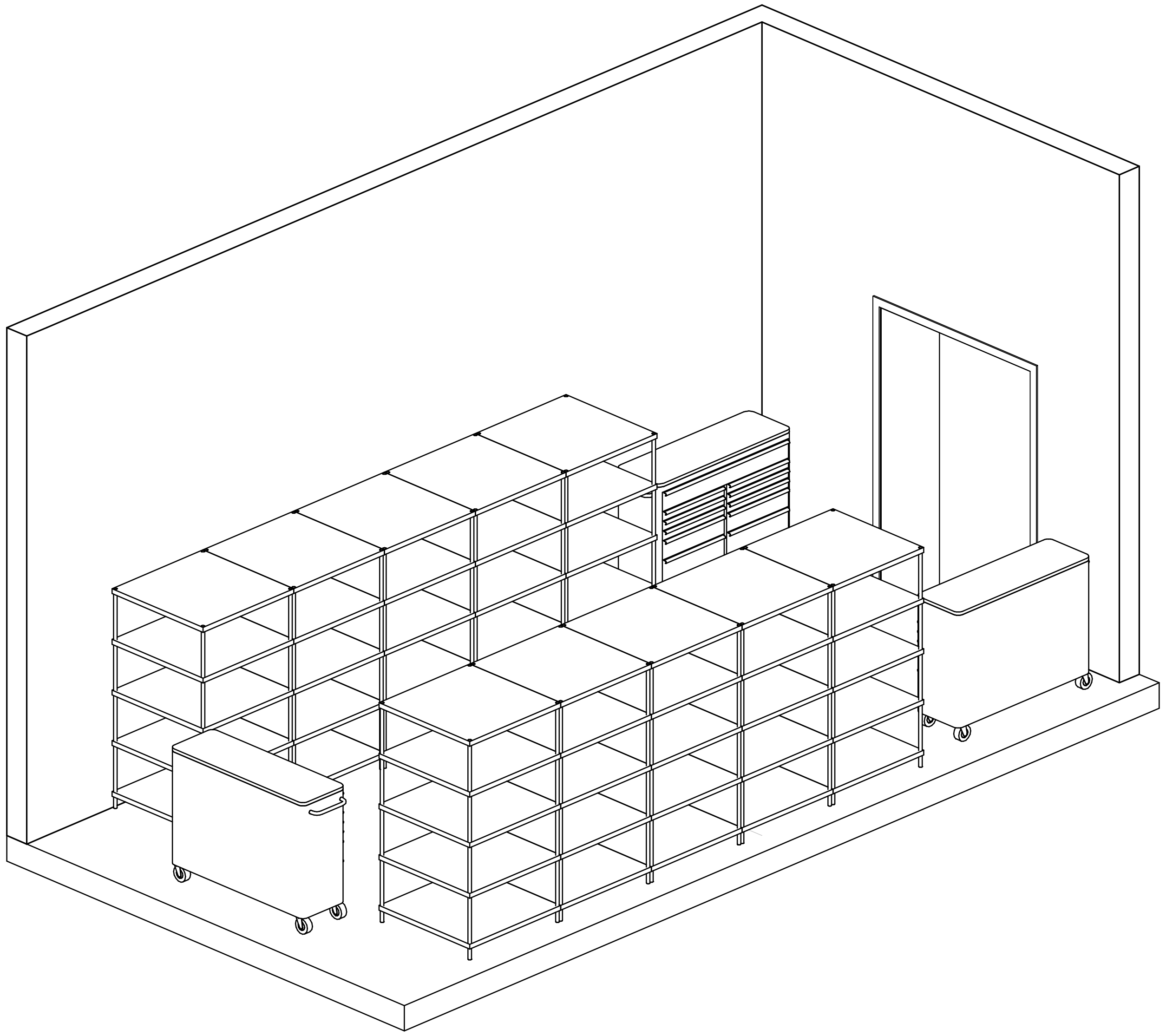
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A36	MOBILE TOOL CABINET		
A77	STORAGE SHELVING, TALL, OPEN, DEEP 36"		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.7	**RDS: 042-3**
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LAB SUPPORT	LAB CERTIFICATION REQUIREMENTS:	**SPACE NAME: NDE EQUIPMENT STORAGE**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: NON DESTRUCTIVE EVALUATION — SECONDARY ADJACENCY — TERTIARY ADJACENCY		





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT	SPACE ID#: 4.8	RDS-043-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 48.60	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	MATERIAL TESTING EQUIPMENT STORAGE
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Requires open area with shelving to accommodate equipment storage.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE:
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: 4m
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: F-FRAME
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: 1m
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: NO
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: N/A
- OTHER / COMMENTS: STORAGE SHELVING
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD: NO
- FAUCET TYPE: N/A
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL:
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- **HAZARD 1**
- **HAZARD 2**
- **HAZARD 3**

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 7.2 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

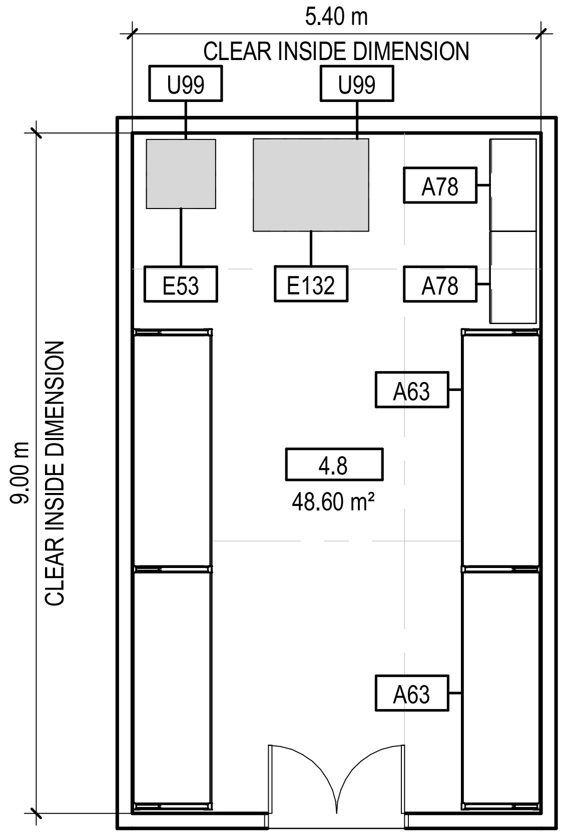
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 120V / XXX / 1 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: N/A
- OTHER / COMMENTS:

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION: NO
- PUBLIC PAGING:N/A
- INTERCOM: NO
- DATA TYPE / POINTS: N/A
- DATA PLUG SPACING:
- WIRELESS: NO
- CABLE TRAY TYPE: N/A
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.8	RDS: 043-2
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT		SPACE NAME: MATERIAL TESTING EQUIPMENT STORAGE
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MATERIAL AND COMPONENT TESTING — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



1 043-2 4.8 - MATERIAL TESTING EQUIPMENT STORAGE

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LEGEND

ARCHITECTURAL SYSTEMS

A63	STORAGE SHELVING, INDUSTRIAL
A78	STORAGE UNIT, 8 DRAWER

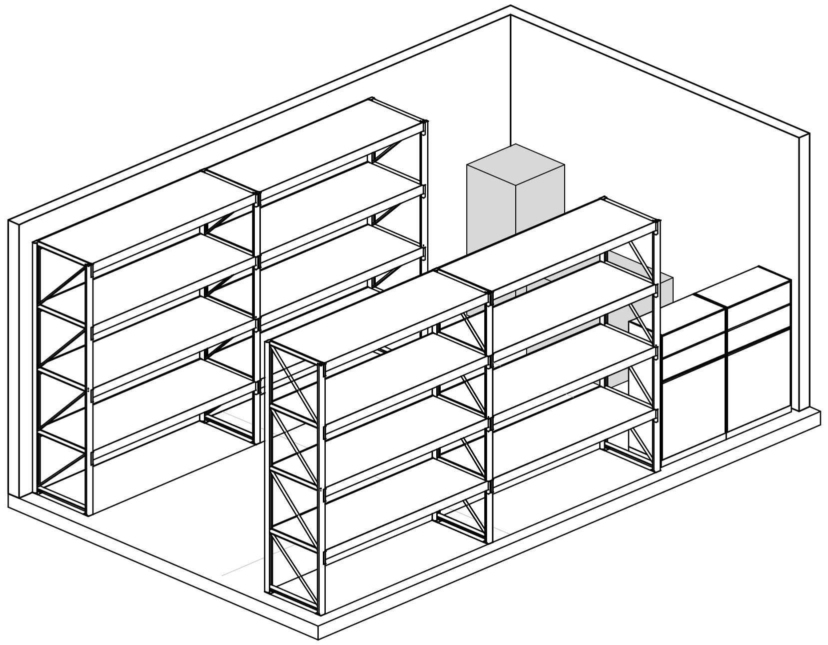
UTILITIES / SYSTEMS

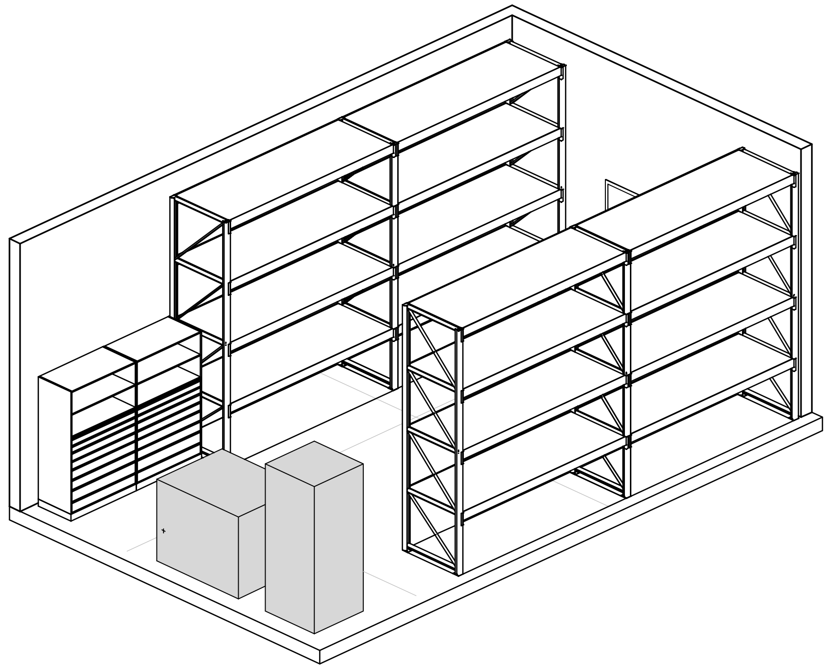
U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E53	TEMPERATURE AND HUMIDITY CHAMBER
E132	3710 TEST OVEN - MTS

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.8		RDS: 043-3
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT	LAB CERTIFICATION REQUIREMENTS:		SPACE NAME: MATERIAL TESTING EQUIPMENT STORAGE
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MATERIAL AND COMPONENT TESTING — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT	SPACE ID#: 4.9	RDS-044-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 25.92	Space Name: HTM TESTING EQUIPMENT STORAGE
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES: Requires open area for equipment storage.			

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE:
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: 4m
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: N/A
- CASEWORK MATERIAL: N/A
- DEPTH: N/A
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: NO
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: N/A
- OTHER / COMMENTS:
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD: NO
- FAUCET TYPE: N/A
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL:
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- **HAZARD 1**
- **HAZARD 2**
- **HAZARD 3**

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 7.2 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:

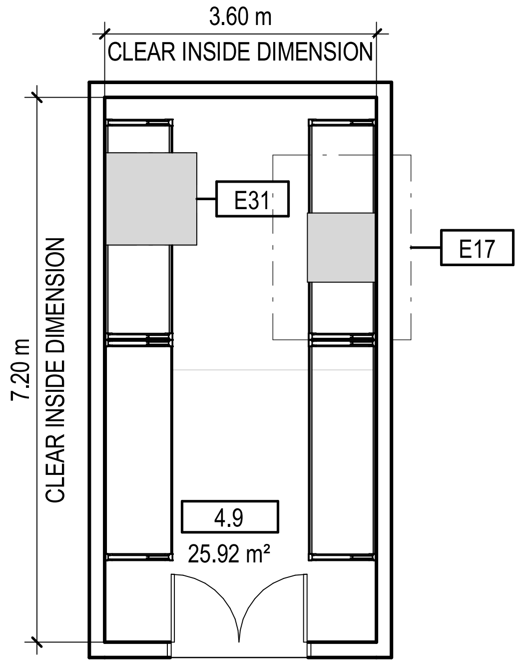
LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION:
- PUBLIC PAGING:
- INTERCOM:
- DATA TYPE / POINTS: N/A
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:
- DATA CONNECTIONS TO EQUIPMENT?

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:

Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.9	RDS: 044-2
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT	LAB CERTIFICATION REQUIREMENTS:	SPACE NAME: HTM TESTING EQUIPMENT STORAGE
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MATERIAL AND COMPONENT TESTING — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



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044-2

4.9 - HTM TESTING EQUIPMENT STORAGE

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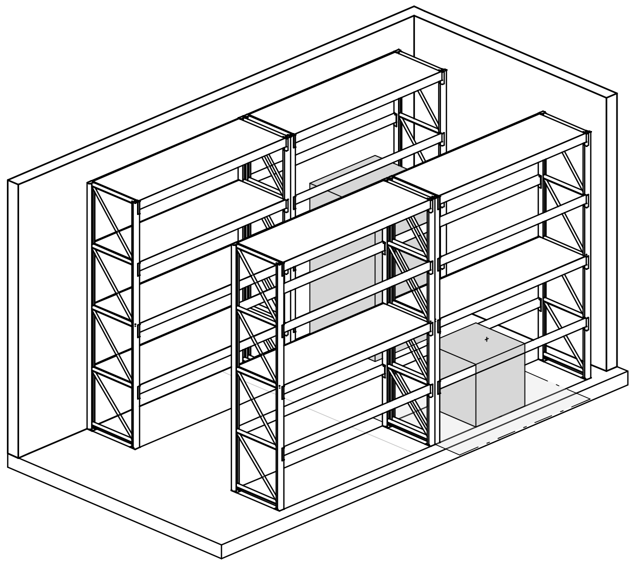
LEGEND

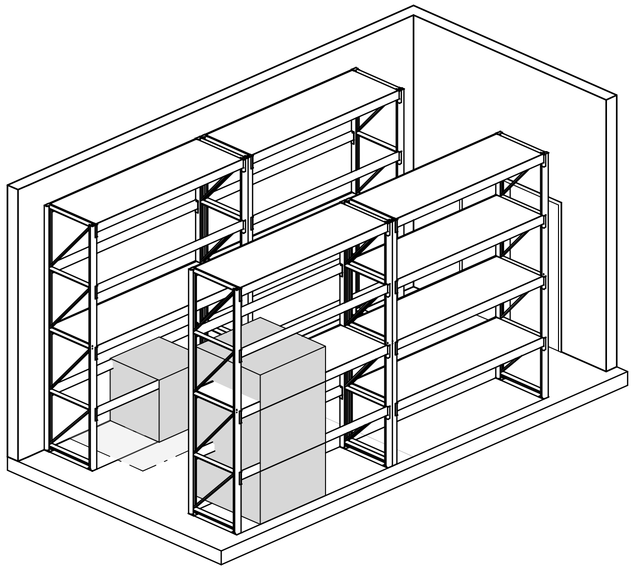
ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
		U99	EQUIP CONNECTIONS PER EQUIP LIST

SPECIALTY EQUIPMENT

E17	S60/111102,SETSYS 16/18 MAIN HOUSING		
E31	INTERFEROMETER STRAIN/DISPLACEMENT		

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.9		**RDS: 044-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: HTM TESTING EQUIPMENT STORAGE**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MATERIAL AND COMPONENT TESTING — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT	SPACE ID#: 4.11	RDS-046-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 17.10	Space Name: GAS CYLINDER STORAGE
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Requires open area for equipment storage. Preferably adjacent to an exterior wall.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS: EPOXY FINISH COAT

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE:
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: 4m
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: N/A
- CASEWORK MATERIAL: N/A
- DEPTH: N/A
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: NO
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: N/A
- OTHER / COMMENTS:

- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): UNCONTROLLED
- SETPOINTS (WINTER): 18ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): UNCONTROLLED
- SETPOINTS (WINTER): UNCONTROLLED
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% EXHAUST
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:
- - DEDICATED EXHAUST SYSTEM WITH PASSIVE OA MAKEUP AIR
- - SPARK RESISTANT CONSTRUCTION OF EQUIPMENT AND DEVICES. (TSTS TO CONFIRM)

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: YES - COMBUSTIBLE GASES AND OXYGEN DEPLETION SENSOR
- LIQUID / LEAK DETECTION: NO
- TEMP: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE: GAS CYLINDER SYSTEM
- GAS TYPES:
- - ARGON GAS DISTRIBUTION MANIFOLD AND PIPELINES TO HOT ISO PRESS
- - PROPYLENE AND OXYGEN MANIFOLD AND PIPELINE DISTRIBUTION TO TGST RIG
- - MANIFOLD AND PIPELINE DISTRIBUTION REQUIRED FOR NITROGEN, PROPANE, ACETYLENE, AND ANY OTHER GASES. (TSTS TO CONFIRM)
- - 35 TO 40 CYLINDERS. APPROX. 10 ARE O2, 6 ARE FUEL TYPE, AND REMAINDER ARE INERT GASES SUCH AS NITROGEN, ARGON...ETC

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD: NO
- FAUCET TYPE: N/A
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL:
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: MULTIPLE
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:
- - FLOOR DRAIN TO ADDRESS SNOW/RAIN CARRYOVER FROM OUTDOOR

FIRE PROTECTION / ALARM
- HAZARD CLASS: ORDINARY HAZARD GROUP 2
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 7.2 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: Pressure relief panel in exterior wall

ELECTRICAL / POWER

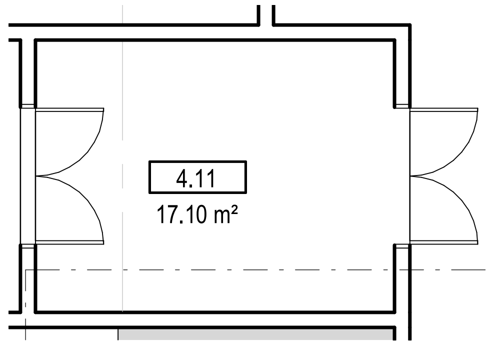
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: N/A
- OTHER / COMMENTS:
- EXPLOSION PROOF DEVICES & FITTINGS

LIGHTING
- SPECIALIZED LIGHTING: YES
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:
- EXPLOSION PROOF LIGHTING

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION: NO
- PUBLIC PAGING:N/A
- INTERCOM: NO
- DATA TYPE / POINTS: N/A
- DATA PLUG SPACING:
- WIRELESS: NO
- CABLE TRAY TYPE: N/A
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 4.11	RDS: 046-2
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT	LAB CERTIFICATION REQUIREMENTS:	SPACE NAME: GAS CYLINDER STORAGE
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: HOT ISO-STATIC PRESS, TGST RIG — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



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046-2

4.11 - GAS CYLINDER STORAGE

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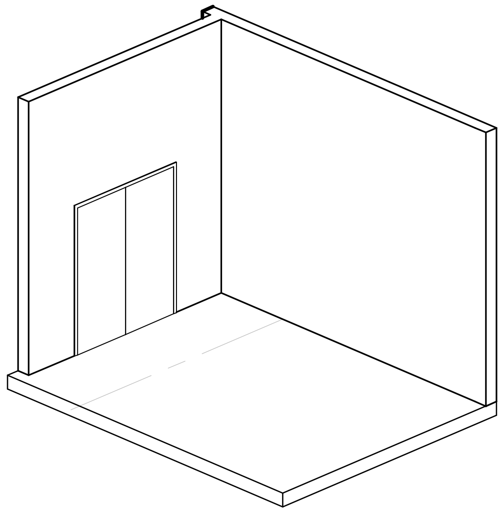
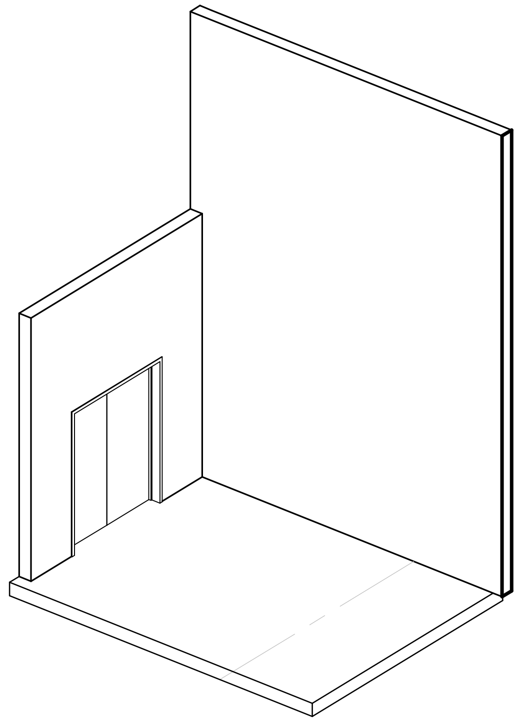
LEGEND

ARCHITECTURAL SYSTEMS	UTILITIES / SYSTEMS

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 4.11		**RDS: 046-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: GAS CYLINDER STORAGE**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: HOT ISO-STATIC PRESS, TGST RIG — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 9, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB ENGINEERING LAB	SPACE TYPE: LAB SUPPORT	SPACE ID#: 4.12	RDS-047-1
CHIEF SCIENTIST: Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 12.96	Space Name: OIL STORAGE ROOM
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES: Oil storage room with shelving.			

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE: NOT REQUIRED
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE: YES
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m²):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: 4m
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT: N/A
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: NO
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: N/A
- OTHER / COMMENTS: OPEN STORAGE SHELVING, MOBILE SHELVING
- PREFERRED VENDOR(S):
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT:
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS: NO
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): UNCONTROLLED
- SETPOINTS (WINTER): 18ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): UNCONTROLLED
- SETPOINTS (SUMMER): UNCONTROLLED
- +/- % RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% EXHAUST
- SPECIALITY EXHAUST: DEDICATED CONTINUOUS EXHAUST
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQUIPMENT EXHAUST:
- MECHANICAL NOISE (DECIBELS / NC): NC50
- COMMENTS: - SPARK RESISTANT EXHAUST FAN CONSTRUCTION

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: YES (ALARM ONLY)
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES
- COMMENTS: 3x 45 GAL DRUMS STORING WASTE MATERIAL (WASTE OIL, WASTE SOLVENTS, AND SPARE WASTE DRUM). CONSUMABLE MATERIALS INCLUDE: JET FUEL AND AVIAN GAS (JET A) STORED IN JERRYCANS, GASOLINE FOR CHAINSAW AND HEAVY EQUIP. STORED IN JERRYCANS. FUEL CONSUMING EQUIP. STORED IN ROOM.
- - SHELVES TO STORE LUBRICATING OILS, WATER SOLUABLE OILS, AND ALCOHOLS, COOLANTS.

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES:

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE: N/A
- PIPING MATERIAL:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO
- OTHER:

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH (mm):
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM:
- EFFLUENT pH CONTROL:
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:
- - DRY SRPINKLER HEAD FROM BASE BUILDING WET SYSTEM IS CONSIDERED

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- CHEMICAL - HYDRAULIC OIL, JET FUEL
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 7.2 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

ELECTRICAL / POWER

- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: N/A
- OTHER / COMMENTS:
- EXPLOSION PRROF DEVICES & FITTINGS

LIGHTING
- SPECIALIZED LIGHTING: YES
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:
- EXPLOSION PROOF LIGHTING

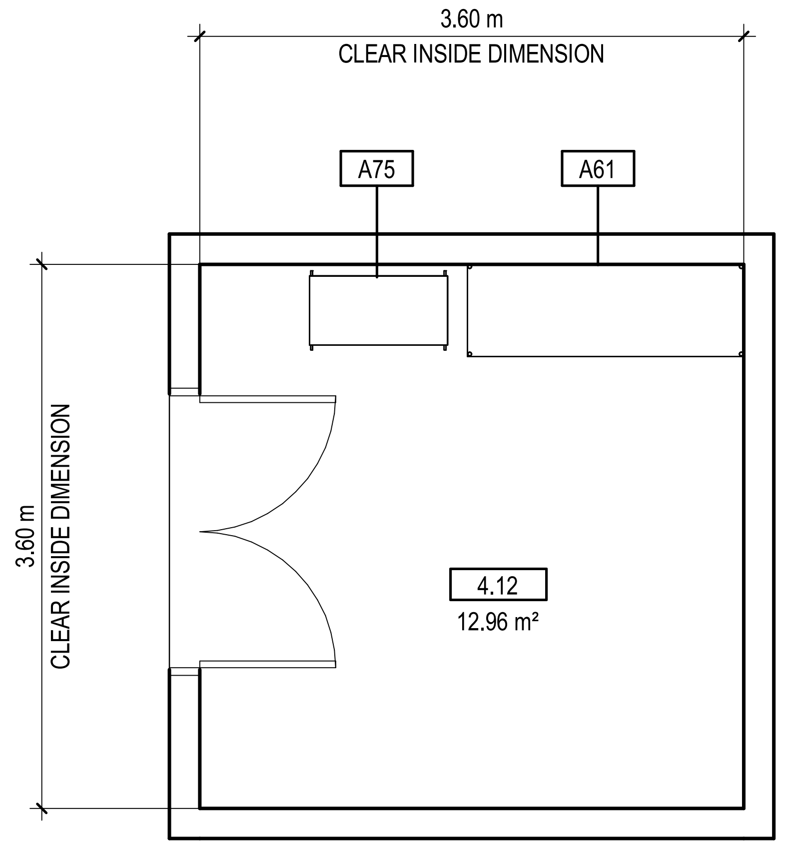
COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION: NO
- PUBLIC PAGING:N/A
- INTERCOM: NO
- DATA TYPE / POINTS: N/A
- DATA PLUG SPACING:
- WIRELESS: NO
- CABLE TRAY TYPE: N/A
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 9, 20/05/2021		SPACE ID #: 4.12	RDS: 047-2
DEPARTMENTS / GROUP NAME: TSB ENGINEERING LAB	SPACE TYPE: LAB SUPPORT		SPACE NAME: OIL STORAGE ROOM
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	

REQUIRED ADJACENCIES:

ROOM — PRIMARY ADJACENCY: PUMP ROOM — SECONDARY ADJACENCY — TERTIARY ADJACENCY



1 / 047-2 **4.12 - OIL STORAGE ROOM**

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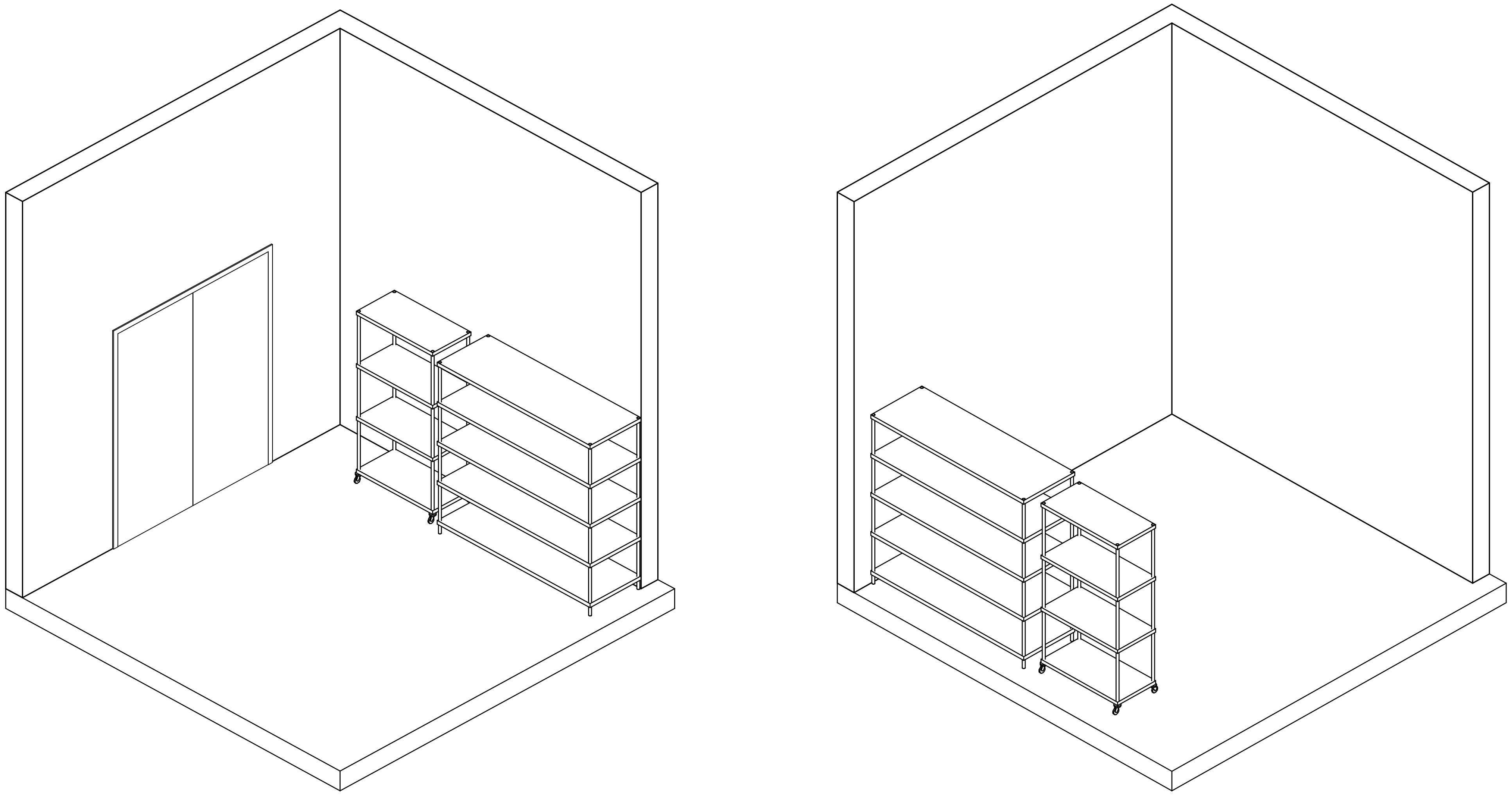
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A61	STORAGE SHELVING, TALL, OPEN 72"		
A75	MOBILE SHELVING		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 9, 20/05/2021		SPACE ID #: 4.12	**RDS: 047-3**
DEPARTMENTS / GROUP NAME: TSB ENGINEERING LAB	SPACE TYPE: LAB SUPPORT		**SPACE NAME: OIL STORAGE ROOM**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: PUMP ROOM — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT	SPACE ID#: 4.13	RDS-048-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 12.96	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	BURNER RIG STORAGE
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Requires open area for complete with shelving to accommodate equipment storage.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE:
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE:
- PRESSURE PERFORMANCE:
- WALL FINISH:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: 4m
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: F-FRAME
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: NO
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: N/A
- OTHER / COMMENTS: OPEN STORAGE SHELVING, MOBILE SHELVING

- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

ADDITONAL USER COMMENTS

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD: NO
- FAUCET TYPE: N/A
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL:
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 7.2 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION: NO
- PUBLIC PAGING:
- INTERCOM: NO
- DATA TYPE / POINTS: N/A
- DATA PLUG SPACING:
- WIRELESS: NO
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

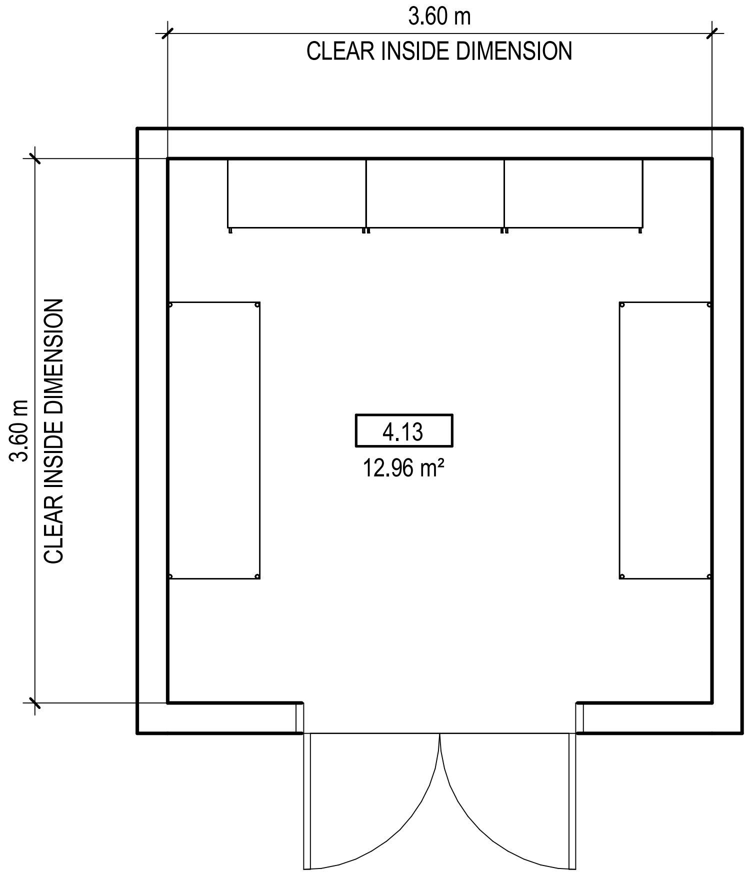
SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:

Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.13	RDS: 048-2
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT		SPACE NAME: BURNER RIG STORAGE
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	

REQUIRED ADJACENCIES:

- ROOM
- PRIMARY ADJACENCY: BURNER RIG #1 AND #2
- SECONDARY ADJACENCY: SPIN AND BURNER RIG EQUIP SUPPORT
- TERTIARY ADJACENCY



1
048-2
4.13 - BURNER RIG STORAGE
1 : 50

LEGEND

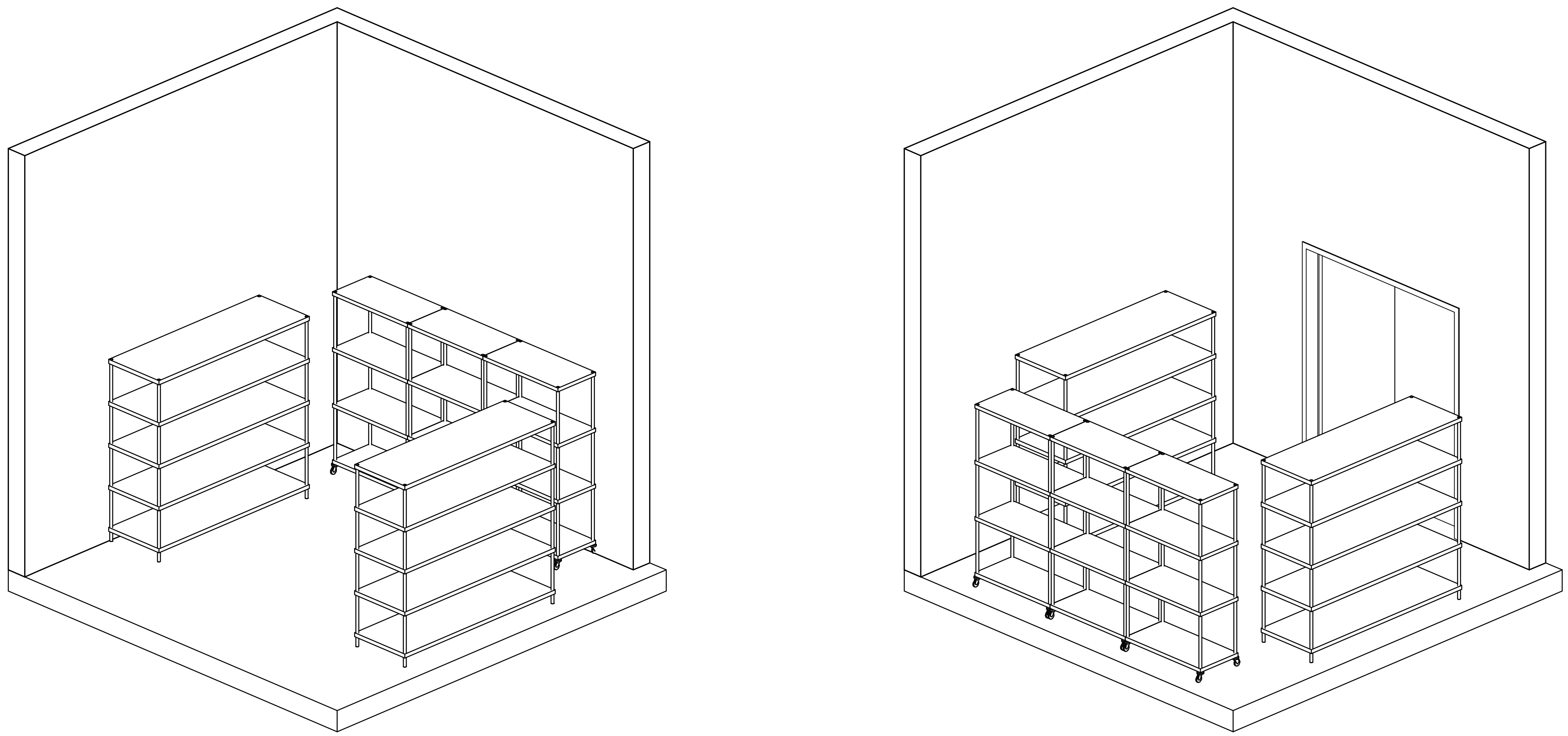
ARCHITECTURAL SYSTEMS

A61	STORAGE SHELVING, TALL, OPEN 72"
A75	MOBILE SHELVING

UTILITIES / SYSTEMS

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.13		RDS: 048-3
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT			SPACE NAME: BURNER RIG STORAGE
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: BURNER RIG #1 & #2 — SECONDARY ADJACENCY: SPIN AND BURNER RIG EQUIP SUPPORT — TERTIARY ADJACENCY			



REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT	SPACE ID#: 4.14	RDS-049-1
CHIEF SCIENTIST: Rick Kearsey	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 64.80	Space Name: SECURED STORAGE FOR CONTROL GOODS
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Requires open area with shelving to accommodate storage requirements.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE:
- OTHER / COMMENTS:

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE:
- OTHER / COMMENTS:

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m²):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: 5m
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS: 1200 mm (4') WIDE ROLL-UP DOORS PREFERRED FOR STORAGE COMPARTMENTS

CASEWORK / MILLWORK
- CASEWORK SYSTEM: F-FRAME
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: NO
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: N/A
- OTHER / COMMENTS: OPEN STORAGE SHELVING
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: DOUBLE
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 900 mm x 2150 mm
- VISION PANEL: BOTH LEAVES
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE: OVERHEAD DOOR
- PRIMARY LEAF: 1800 mm x 3600 mm
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% SUPPLY
- SPECIALITY EXHAUST: N/A
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: N/A
- MECHANICAL NOISE (DECIBELS / NC): NC50
- OTHER / COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES: N/A

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD: NO
- FAUCET TYPE: N/A
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL:
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 7.2 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

ELECTRICAL / POWER

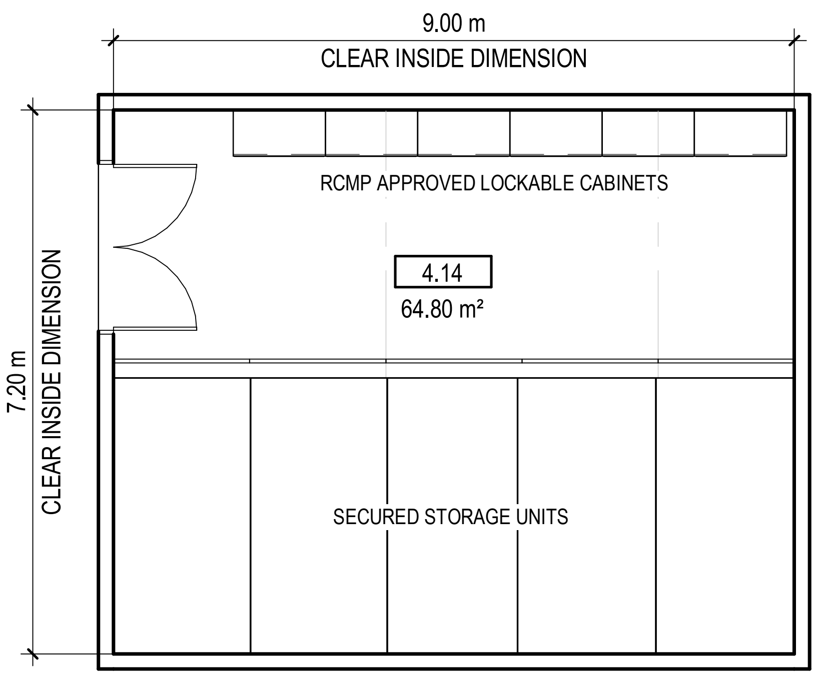
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3 PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: PENDANT CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: N/A
- CELLULAR COMMUNICATION: NO
- PUBLIC PAGING:N/A
- INTERCOM: NO
- DATA TYPE / POINTS: N/A
- DATA PLUG SPACING:
- WIRELESS: NO
- CABLE TRAY TYPE: N/A
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- CARD
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.14	**RDS: 049-2**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT		**SPACE NAME: SECURED STORAGE FOR CONTROL GOODS**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY NRC HIGH BAY — SECONDARY ADJACENCY — TERTIARY ADJACENCY SPIN RIG		



1 / 049-2 **4.14 - SECURED STORAGE FOR CONTROL GOODS**

1 : 100

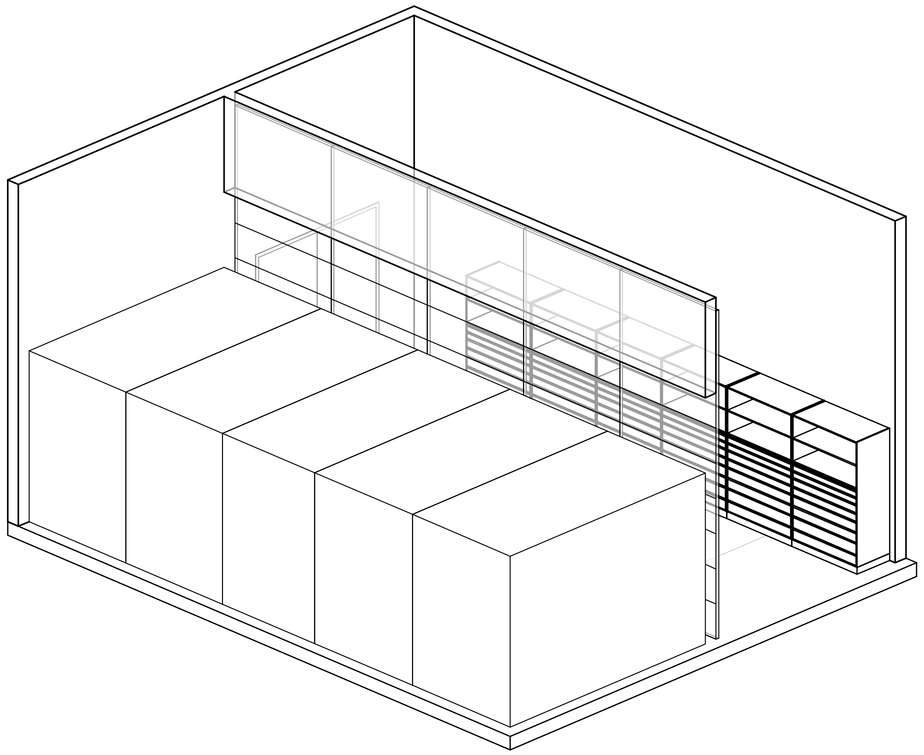
LEGEND

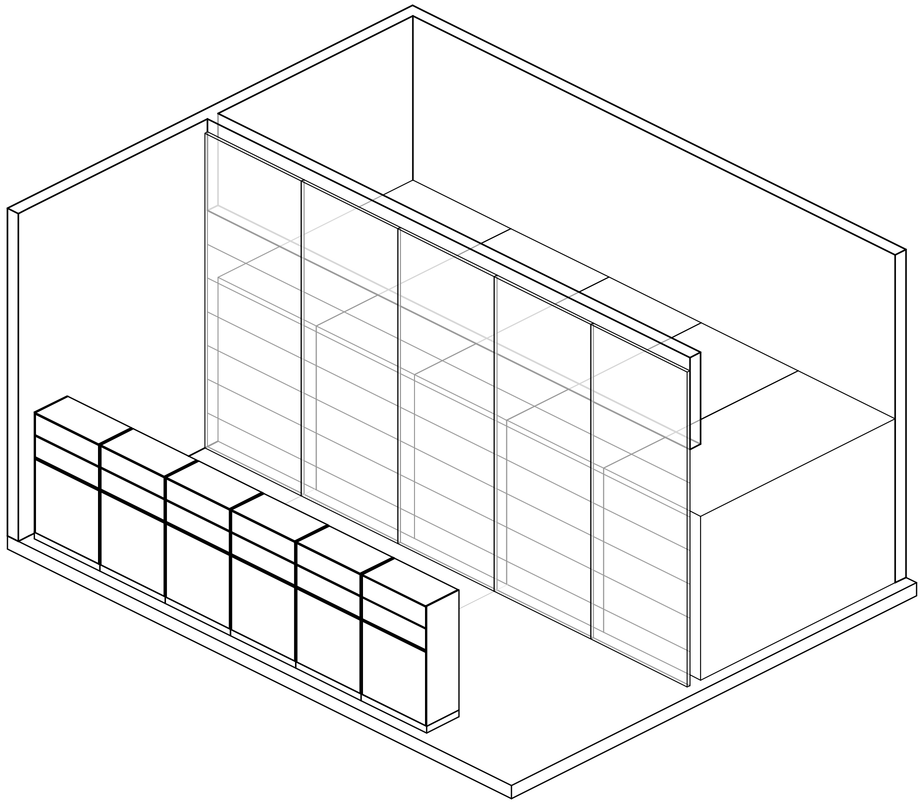
ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A78	STORAGE UNIT, 8 DRAWER		

SPECIALTY EQUIPMENT

FRAMEWORK

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.14		**RDS: 049-3**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: LAB SUPPORT			**SPACE NAME: SECURED STORAGE FOR CONTROL GOODS**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: NRC HIGH BAY — SECONDARY ADJACENCY — TERTIARY ADJACENCY: SPIN RIG			





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LAB SUPPORT	SPACE ID#: 4.15	RDS-050-1
CHIEF SCIENTIST: Rick Kearsey & Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 38.88	Space Name: MACHINE SHOP TOOL ROOM
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 8AM-5PM	SPECIE USE: N/A	
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Storage room for machine shop tools. Requires open room with storage shelving.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE: NOT REQUIRED
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE: YES
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: TILE CEILING (HUNG)
- HEIGHT: 4m
- FINISH: ACOUSTIC TILE
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: NO
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: N/A
- OTHER / COMMENTS: MOBILE TOOL CABINET, OPEN STORAGE SHELVING, CLOSED STORAGE SHELVING, 8 DRAWER STARAGE UNIT
- PREFERRED VENDOR(S):
- CHEMICAL STORAGE:
- ACID:
- BASE:
- FLAMMABLE LIQUIDS:
- STORAGE CABINET: YES
- STORAGE DRAWER UNIT: YES
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:

DOORS/ HARDWARES
- DOOR TYPE: SINGLE + HALF
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 600 mm x 2150 mm
- VISION PANEL: PRIMARY LEAF
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m²):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

ADDITONAL USER COMMENTS

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% EXHAUST
- SPECIALITY EXHAUST:
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQUIPMENT EXHAUST:
- MECHANICAL NOISE (DECIBELS / NC): NC50
- COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: NO
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES:

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- **HAZARD 1**
- **HAZARD 2**
- **HAZARD 3**

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 7.2 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS:

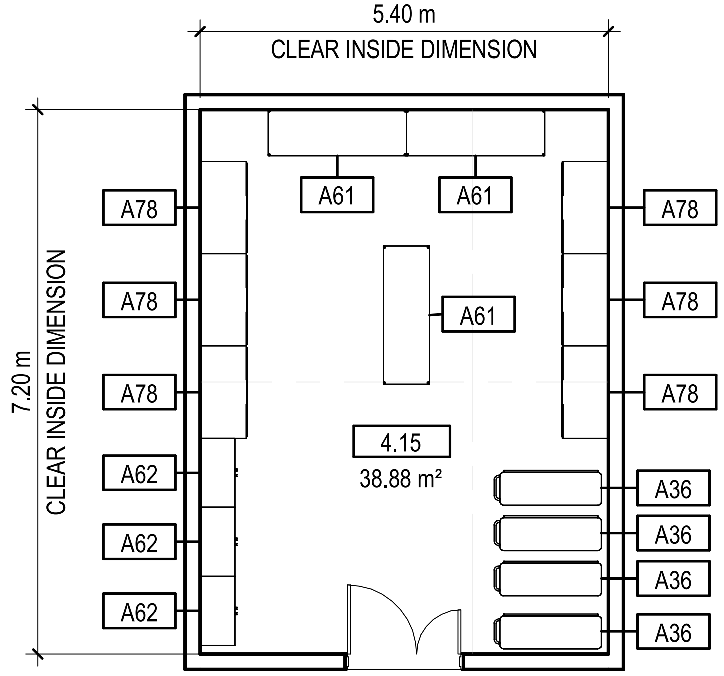
ELECTRICAL / POWER
- CLASS TYPE: NORMAL
- VOLTAGE / CURRENT / PH 1: 600V / XXX / 3 PHASE
- VOLTAGE / CURRENT / PH 2: 208V / XXX / 3 PHASE
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER: N/A
- ISOLATED GROUNDING: N/A
- GROUND FAULT PROTECTION: N/A
- WEATHER PROOF COVER: N/A
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY: N/A
- PLUG SPACING:
- FLOOR BOX W TRENCH: NO
- OTHER / COMMENTS:

LIGHTING
- SPECIALIZED LIGHTING: NO
- SPECIALIZED CONTROL: NO
- MOUNT: RECESSED CEILING
- FIXTURE OUTPUT: DIRECT
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN): 4000
- DIMMING SYSTEM: NO
- WHITE TUNING:
- TASK LIGHTING: NO
- SCENE/ZONE CONTROL: NO
- OCCUPANCY SENSORS: YES
- NIGHT LIGHT: NO
- DAYLIGHT CONTROL: NO
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS: NO
- A/V EQUIPMENT INTERFACE: NO
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE: YES
- CELLULAR COMMUNICATION:
- PUBLIC PAGING: YES
- INTERCOM: NO
- DATA TYPE / POINTS: COPPER RJ45
- DATA PLUG SPACING:
- WIRELESS: YES
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- CARD
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 4.15	**RDS: 050-2**
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LAB SUPPORT		**SPACE NAME: MACHINE SHOP TOOL ROOM**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY MACHINE WORKSHOP — SECONDARY ADJACENCY WELDING WORKSHOP — TERTIARY ADJACENCY WOOD WORKSHOP		



1 050-2 **4.15 - MACHINE SHOP TOOL ROOM**

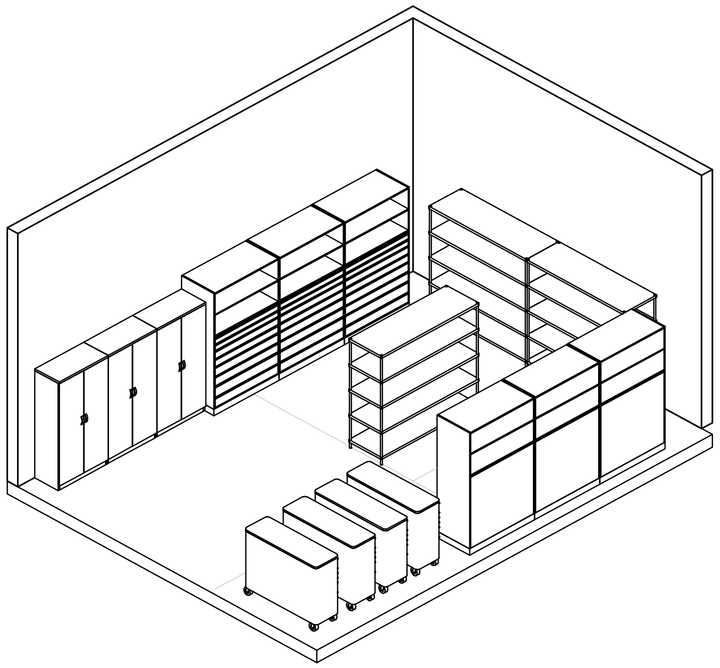
1 : 100

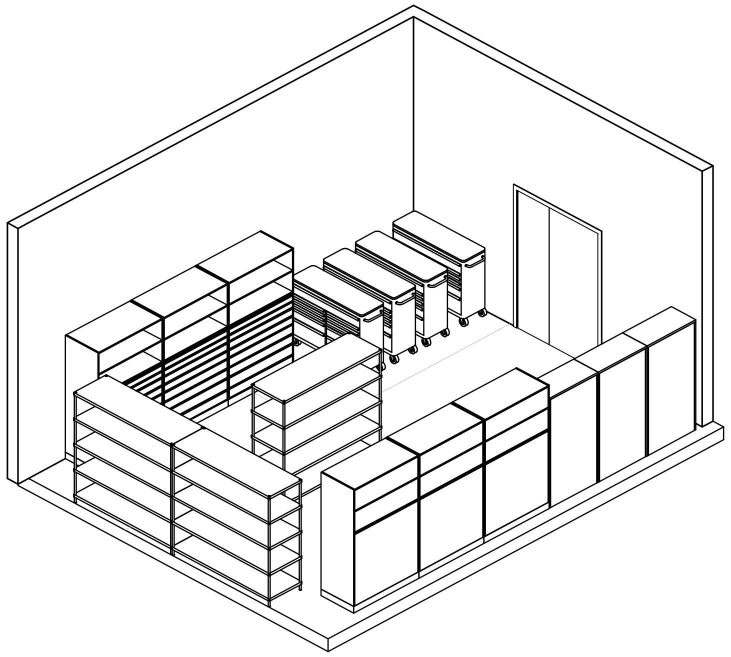
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A63	STORAGE SHELVING, INDUSTRIAL		
A64	WORKBENCH, MOBILE		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 4.15	**RDS: 050-3**
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LAB SUPPORT	LAB CERTIFICATION REQUIREMENTS:	**SPACE NAME: MACHINE SHOP TOOL ROOM**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 8AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: MACHINE WORKSHOP — SECONDARY ADJACENCY: WELDING WORKSHOP — TERTIARY ADJACENCY: WOOD WORKSHOP		





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LAB SUPPORT	SPACE ID#: 4.16	RDS-051-1
CHIEF SCIENTIST: Rick Kearsey & Martin Breton	CONTAINMENT RISK LEVEL: CL2		AREA (m2): 14.40	Space Name:
CMO REP: Ann Marie Sibbald	LAB CERTIFICATION REQUIREMENTS:	OPERATING HOURS: 7AM-5PM	SPECIE USE: N/A	SEM PREP ROOM
LC REP: Sophie Harvey	ROOM FUNCTION AND ACTIVITES:	Open area with shelving to accommodate equipment storage.		

ARCHITECTURAL

FLOOR FINISH
- TYPE: CONCRETE (SMOOTH AND SEALED FINISH)
- SLIP RESISTANCE:
- ANTI-STATIC RESISTANCE: NOT REQUIRED
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

FLOOR BASE
- TYPE: RUBBER
- INTEGRAL COVE:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

WALL TYPE / CONSTRUCTION
- WALL TYPE: MASONRY
- SHIELDING:
- IMPACT RESISTANT:
- WATER RESISTANT:
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- WALL FINISH: PAINT
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

PRIMARY CONTAINMENT DEVICE
- PRIMARY CONTAINMENT DEVICE:
- PRIMARY CONTAINMENT DEVICE:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

ACCESSIBLITY REQUIREMENTS
- ACCESSIBILITY ELEMENT 1:
- ACCESSIBILITY ELEMENT 2:
- ACCESSIBILITY ELEMENT 3:
- ACCESSIBILITY ELEMENT 4:

SUSTAINABILITY REQUIREMENTS
- SPACE REQUIRED FOR RECYCLING BIN (m^2):
- SPACE REQUIRED FOR COMPOSTING BIN (m2):
- UNOCCUPIED PERIOD TEMP. SET BACK:
- TEMPERATURE SET BACK MAXIMUM (ºC):
- TEMPERATURE SET BACK MINIMUM (ºC):
- INDIVIDUAL TEMPERATURE CONTROL:
- OTHER / COMMENTS:

CEILING
- CEILING TYPE: OPEN CEILING
- HEIGHT: 4m
- FINISH: OPEN CEILING (PAINTED)
- ACOUSTIC PERFORMANCE: STC 50
- PRESSURE PERFORMANCE:
- OTHER / COMMENTS:

SPECIAL DESIGN CONSIDERATIONS
- GASEOUS DECONTAMINATION:
- SURFACE DECONTAMINATION:
- FIRE EXTINGUISHER CABINET:
- CRANE SUPPORT
- ELECTROMAGNETIC SHIELDING:
- PENETRATION SEALING:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

CASEWORK / MILLWORK
- CASEWORK SYSTEM: MODULAR LEG FRAMED
- CASEWORK MATERIAL: PAINTED METAL
- DEPTH: (OTHER-DEFINE)
- UPPER CABINETS: N/A
- HEIGHT ADJUSTABLE: NO
- BASE CABINETS: N/A
- COUNTERTOP MATERIAL: N/A
- OTHER / COMMENTS: OPEN STORAGE SHELVING
- PREFERRED VENDOR(S):
- CHEMICAL STORAGE: YES
- ACID:
- BASE:
- FLAMMABLE LIQUIDS: YES
- STORAGE CABINET: NO
- STORAGE DRAWER UNIT: NO
- SHIELDED STORAGE UNIT: NO
- OVERHEAD SERVICE CARRIER: NO
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

ADDITONAL USER COMMENTS

WINDOWS / DAYLIGHTING
- NATURAL LIGHT: NOT REQUIRED
- WINDOWS:
- OPERABLE:
- SAFETY GLAZING:
- SAFETY ETCHING:
- SHADE CONTROL:
- OTHER / COMMENTS:
- PREFERRED VENDOR(S):

DOORS/ HARDWARES
- DOOR TYPE: SINGLE + HALF
- PRIMARY LEAF: 900 mm x 2150 mm
- SECONDARY LEAF (IF APPLCABLE): 600 mm x 2150 mm
- VISION PANEL: PRIMARY LEAF
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE: BOTH SIDES
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:
- DOOR TYPE:
- PRIMARY LEAF:
- SECONDARY LEAF (IF APPLCABLE):
- VISION PANEL:
- LOCKSET TYPE:
- ARMOUR PLATE:
- KICK PLATE
- ACCESS CONTROL:
- DOOR INTERLOCK: (IF APPLICABLE)
- INDICATOR: (IF APPLICABLE)
- DOOR BUMPERS:
- DOOR JAMB GUARDS:
- OTHER / COMMENTS:

MECHANICAL

TEMPERATURE
- SETPOINTS (SUMMER): 25ºC
- SETPOINTS (WINTER): 21ºC
- +/- 1ºC

CONTROLS
- CONTROLS TYPE: ALL DIGITAL
- CONTROLS FRAMEWORK: BACNet OVER IP
- OTHER / COMMENTS:
- - UNOCCUPIED/NIGHT TIME TEMPERATURE SETBACK

HUMIDITY
- STATS: ZONE
- SETPOINTS (SUMMER): 50% RH
- SETPOINTS (WINTER): 30% RH
- +/- 5% RH
- TRIM HUMIDIFICATION: NO

VENTILATION
- AIR CHANGES PER HOUR: PENDING LAB VENTILATION RISK ASSESSMENT
- PRESSURE (dp - Pascals): PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM FILTRATION - EXHAUST: NONE
- ROOM FILTRATION - SUPPLY: NONE
- AIR CIRCULATION METHOD: 100% EXHAUST
- SPECIALITY EXHAUST:
- DIRECTIONAL AIRFLOW: PENDING LAB VENTILATION RISK ASSESSMENT
- DIRECTIONAL AIRFLOW METHOD: FORCED
- PASCAL OFFSET DIFFERENCE: PENDING LAB VENTILATION RISK ASSESSMENT
- ROOM ISOLATION DAMPERS: NONE
- FILTRATION TYPE: N/A
- PRESSURE AIRFLOW INDICATOR: NONE
- EQ. EXHAUST: FUMEHOOD
- MECHANICAL NOISE (DECIBELS / NC): NC45
- COMMENTS:

MONITORING AND ALARMS
- PRESSURE / AIRFLOW INDICATOR: NO
- EQUIPMENT MONITORING POINTS: NO
- HVAC ALARM RELATIVE PRESSURIZATION: NO
- ANIMAL ROOM MONITORING SYSTEM: NO
- GAS DETECTION: NO
- LIQUID / LEAK DETECTION: NO
- TEMP / HUMIDITY: YES

PROCESS PIPING
- PROCESS WATER: NO
- STEAM: NO
- COMP. AIR: YES (LAB)
- BREATHING AIR: NO
- ANIMAL WATER: NO
- PURIFIED WATER: NO
- OTHER PROCESS FLUIDS:
- OTHER PROCESS FLUIDS:

GASES
- SUPPLY SYSTEM TYPE:
- GAS TYPES:

PLUMBING

FIXTURES
- SINK TYPES: N/A
- SINK DEPTH:
- SINK COUNTS:
- SINK DIMENSIONS:
- INTEGRAL TO CASEWORK / BENCHTOP:
- PEGBOARD:
- FAUCET TYPE:
- PIPING MATERIAL TYPE:
- SIZE DIAMETER:
- VENT SIZE DIAMETER:
- SAFETY EMERGENCY SHOWER ANSI 358.1: NO
- CORROSIVE MATERIAL: NO
- SAFETY EMERGENCY EYEWASH ANSI 358.1: NO

DRAINS / VENTS
- FLOOR DRAIN: N/A
- TRAP DEPTH:
- MATERIAL
- HEPA FILTERED PLUMBING VENTS:
- EFFLUENT DECONTAMINATION SYSTEM
- EFFLUENT pH CONTROL
- OTHER / COMMENTS:

FIRE PROTECTION / ALARM
- HAZARD CLASS:
- SPRINKLER SYSTEM: YES
- SPRINKLER SYSTEM TYPE: WET PIPE
- FIRE DETECTION: NORMAL (TO CODE)
- ALARM METHOD: NORMAL
- OTHER / COMMENTS:

HAZARDS
- BUILDING HAZARD CLASS (NBC / NSF):
- HAZARD 1
- CHEMICAL, SMALL AMOUNTS
- HAZARD 2
- HAZARD 3

STRUCTURAL
- STRUCTURAL DESIGN IMPLICATIONS:
- ROLLING LOAD LIMITS:
- VIBRATION CRITERA:
- FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
- FLOOR LOADING IMPLICATIONS (LIVE): 12 kPa
- STRUCTURAL SHIELD REQUIREMENT:
- CEILING LOADING:
- SPECIAL PENETRATIONS:
- OTHER / COMMENTS: Within machine shop

ELECTRICAL / POWER

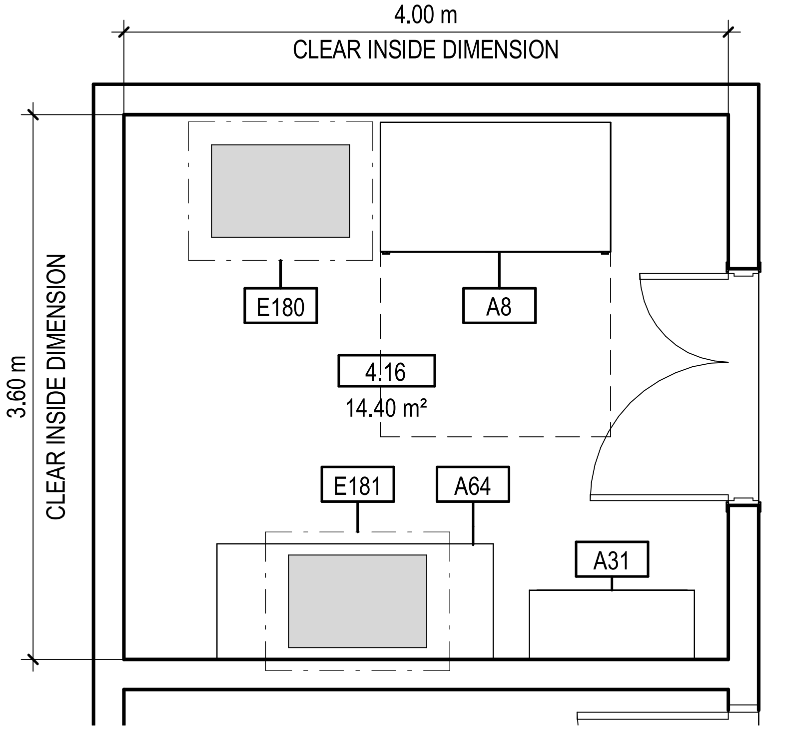
- CLASS TYPE:
- VOLTAGE / CURRENT / PH 1: 208V / XXX / 3PH
- VOLTAGE / CURRENT / PH 2:
- SPECIAL NEMA PLUG ARRANGEMENT:
- POWER DENSITY:
- OVERHEAD SERVICE CARRIER:
- ISOLATED GROUNDING:
- GROUND FAULT PROTECTION:
- WEATHER PROOF:
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- TYPE IP RATING HERE:
- RACEWAY:
- PLUG SPACING:
- FLOOR BOX W TRENCH:
- OTHER / COMMENTS:

LIGHTING
- SPECIALIZED LIGHTING:
- SPECIALIZED CONTROL:
- MOUNT
- FIXTURE OUTPUT:
- LIGHT LEVEL (LUX):
- LIGHT COLOUR TEMP (KELVIN):
- DIMMING SYSTEM:
- WHITE TUNING:
- TASK LIGHTING:
- SCENE/ZONE CONTROL:
- OCCUPANCY SENSORS:
- NIGHT LIGHT:
- DAYLIGHT CONTROL:
- IP RATING: (X 1-6 / Y 1-9) REFER TO RDF SECTION XXX
- SAFETY LIGHTS:
- A/V EQUIPMENT INTERFACE:
- OTHER / COMMENTS:

COMMUNICATIONS
- PHONE:
- CELLULAR COMMUNICATION:
- PUBLIC PAGING:
- INTERCOM:
- DATA TYPE / POINTS:
- DATA PLUG SPACING:
- WIRELESS:
- CABLE TRAY TYPE:
- OTHER / COMMENTS:

SECURITY
- CONNECTION TO CENTRAL MONITORING STATION:
- CCTV:
- EMERGENCY DISTRESS CALL:
- FAIL-SAFE HARDWARE:
- INTRUDER SYSTEM:
- ACCESS CONTROL (OPTIONS BELOW)
- -
- -
- -
- -
- SECURITY EQUIPMENT:
- SECURITY ZONES:
- OTHER / COMMENTS:
- Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.16		**RDS: 051-2**
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LAB SUPPORT			**SPACE NAME: SEM PREP ROOM**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY SEM LABS — SECONDARY ADJACENCY SEM LAB SUPPORT — TERTIARY ADJACENCY			



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051-2

4.16 - SEM PREP ROOM

1 : 50

LEGEND

ARCHITECTURAL SYSTEMS

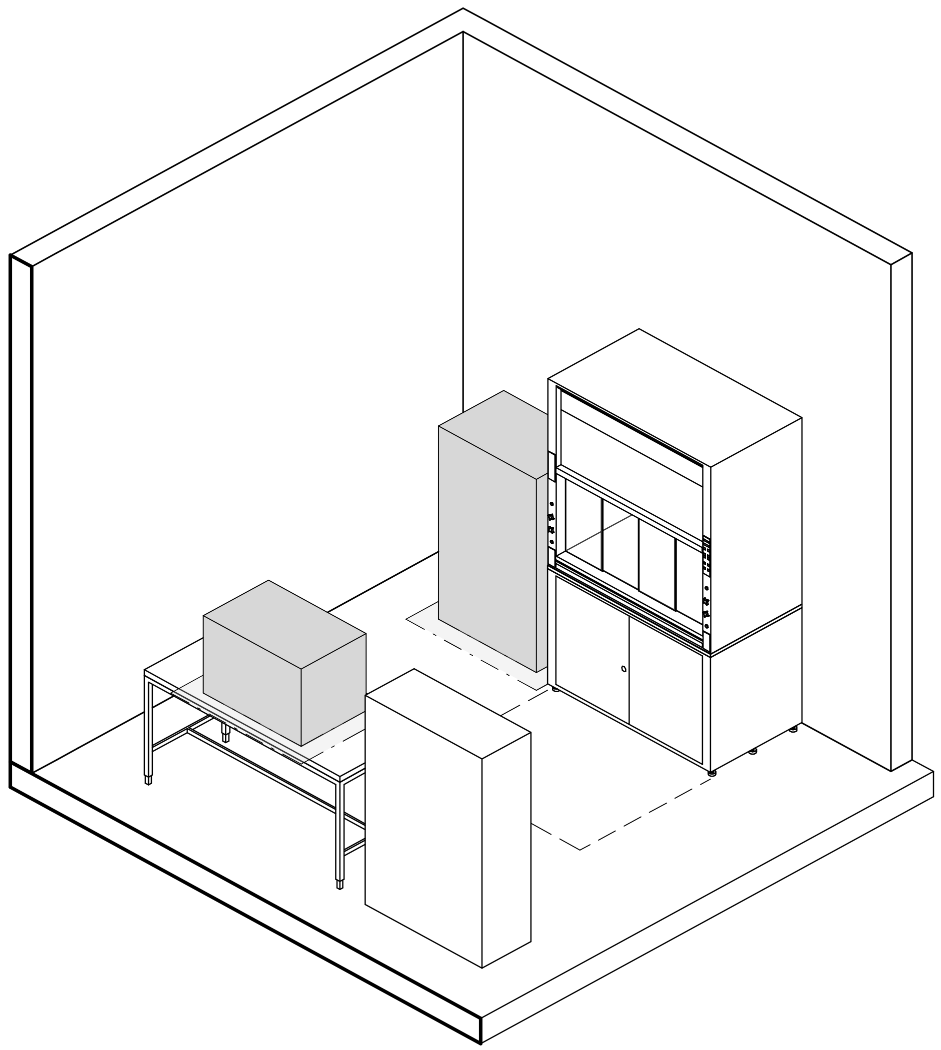
A8	FUMEHOOD (GENERAL PURPOSE), 5'
A31	VENTED ACIDS STORAGE CABINET
A61	STORAGE SHELVING, TALL, OPEN 72"
A64	WORKBENCH, MOBILE

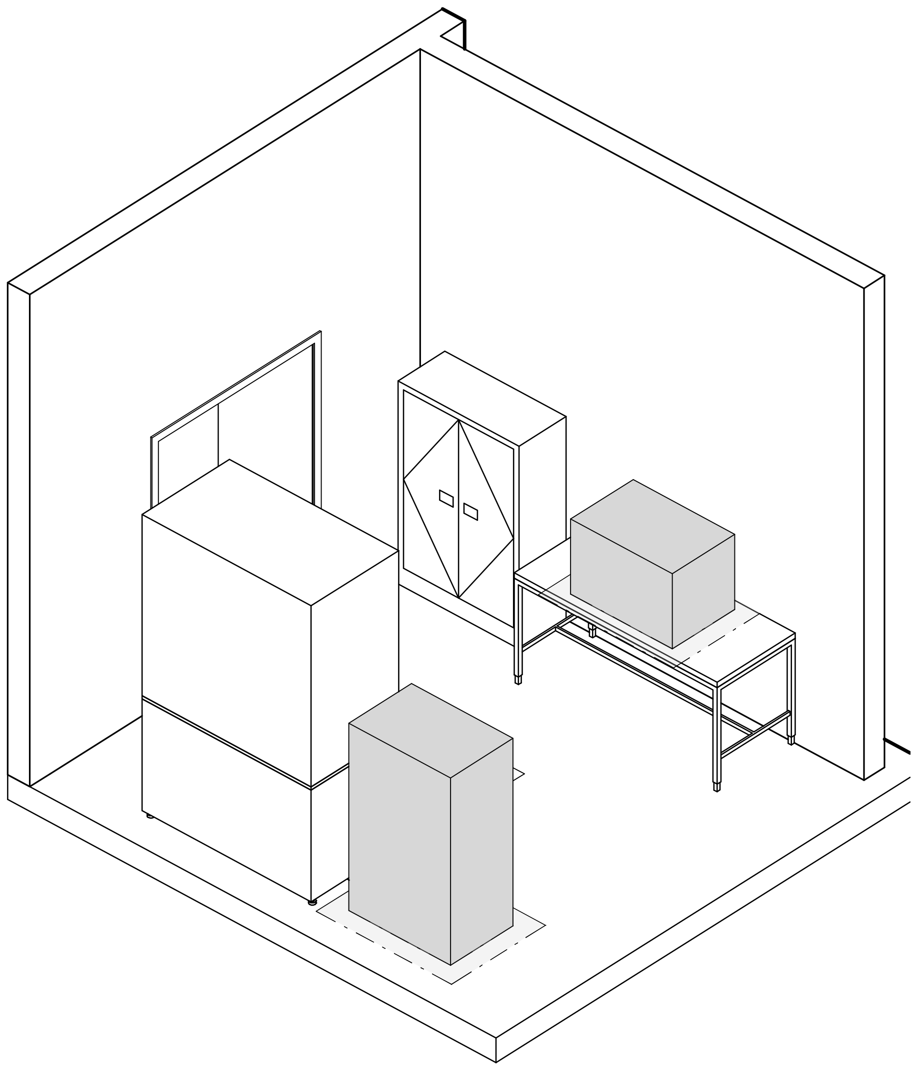
UTILITIES / SYSTEMS

SPECIALTY EQUIPMENT

E180	EDWARDS HIGH VACCUM CARBON COATER
E181	EDWARDS SPUTTER COATER

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 4.16	**RDS: 051-3**
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LAB SUPPORT	LAB CERTIFICATION REQUIREMENTS:	**SPACE NAME: SEM PREP ROOM**
CONTAINMENT RISK LEVEL: CL2	OPERATING HOURS: 7AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: SEM LABS — SECONDARY ADJACENCY: SEM LAB SUPPORT — TERTIARY ADJACENCY		





REVISION # & ISSUE DATE: REV 8, 20/05/2021	**DEPARTMENTS / GROUP NAME: TSTS**	**SPACE TYPE: LOGISTICS / SUPPORT**	**NUMBER OF PEOPLE: 5**	**SPACE ID#: 5.1**	**RDS-052-1**
CHIEF SCIENTIST: Rick Kearsey & Martin Breton	**ADDITIONAL USER COMMENTS:**			**AREA (m2): 38.88**	**Space Name: TSTS SHIPPING AND RECEIVING**
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			**OPERATING HOURS: 8AM-5PM**		

ROOM FUNCTION AND ACTIVITES:

Support activities of TSB in regards to shipping, receiving and tracking of inventory.

ARCHITECTURAL

FLOORING

FLOOR FINISH: CONCRETE (SMOOTH & SEALED FINISH), RUBBER FLOOR BASE

WALL SYSTEM

PARTITION TYPE: MASONRY
ACOUSTIC LEVEL: SPEECH SECURE
INTERIOR GLAZING W/ BLACK-OUT BLINDS

CEILING

CEILING FINISH: ACOUSTIC PANEL
CEILING HEIGHT: 3000mm (10'-0") Min.

CASEWORK / MILLWORK

OPEN STORAGE SHELVING (2)
ADJUSTABLE MOBILE WORKBENCH (3)

WINDOWS / DAYLIGHTING

NATURAL LIGHT: PREFERRED
MOTORIZED SUN-SHADES / BLACK-OUT BLINDS

DOORS/ HARDWARES

DOOR TYPE: WOOD, GLAZED
DOOR HARDWARE: KEYED OR SWIPE CARD
DOOR WIDTH (min): 1100mm
DOOR HARDWARE: ACOUSTIC SEALS
ROOM SCHEDULER

SUSTAINABILITY REQUIREMENT

OTHER / COMMENTS: UNOCCUPIED TEMPERATURE SETBACKS NOT PREFERRED DUE TO ONGOING TESTING DURING UNOCCUPIED PERIODS

SPECIAL DESIGN CONDITIONS

ACCESSIBILITY REQUIREMENT

PLUMBING

DRAINS AND/OR FIXTURES NOT EXPECTED

MECHANICAL

SETPOINTS 24C +/- 1C SUMMER, 22C +/- 1C WINTER
DEMAND CONTROL VENTILATION
30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER
ROOM TEMPERATURE CONTROL
ZONE HUMIDITY CONTROL
SCHEDULED NIGHT SETBACK
ROOM PRESSURIZATION, POSITIVE/NOT MONITORED
HEATING/COOLING TERMINAL SYSTEM PENDING ANALYSIS
MECHANICAL NOISE (DECIBELS / NC): NC30

FIRE PROTECTION / ALARM

WET PIPE SPRINKLER SYSTEM
VISUAL/AUDIBLE ALARM SIGNALS TO NBCC

ELECTRICAL / POWER

SPECIAL EQUIPMENT CONNECTIONS TO BE CONFIRMED
WIREWAYS FOR WORKBENCHES
NORMAL POWER

LIGHTING

OCCUPANCY/VACANCY SENSING
400OK COLOUR TEMP

SECURITY

Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

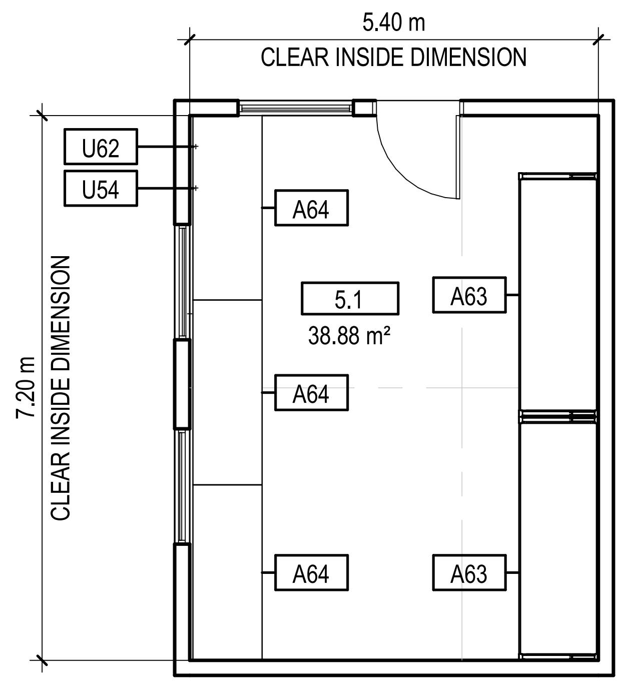
COMMUNICATIONS

CAT6A NETWORK CONNECTIONS - ONE PER USER
PHONE CONNECTION
PUBLIC PAGING
WIRELESS COVERAGE
CABLE TRAY ABOVE CEILING

STRUCTURAL

FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa
Within office neighbourhood

REVISION # & ISSUE DATE: REV 8, 20/05/2021		SPACE ID #: 5.1	RDS: 052-2
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LOGISTICS / SUPPORT	LAB CERTIFICATION REQUIREMENTS:	SPACE NAME: TSTS SHIPPING AND RECEIVING
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



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052-2

5.1 - TSTS SHIPPING AND RECEIVING

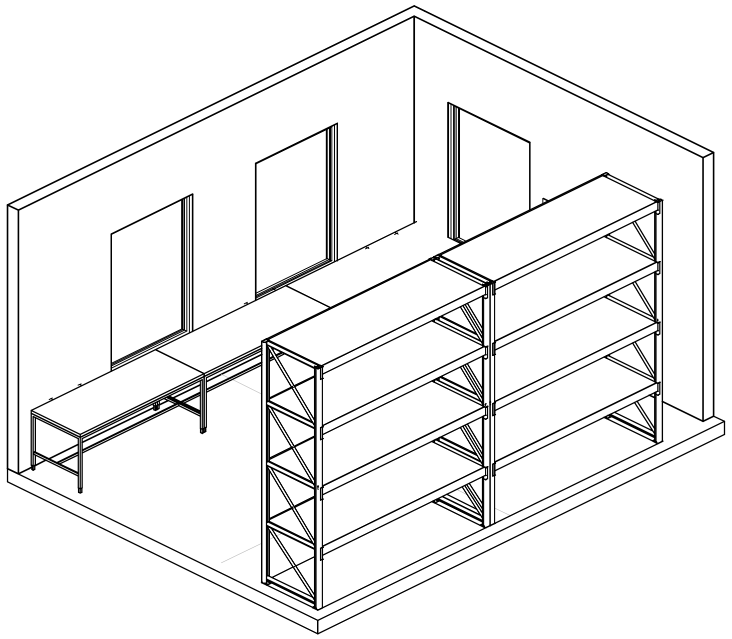
1 : 100

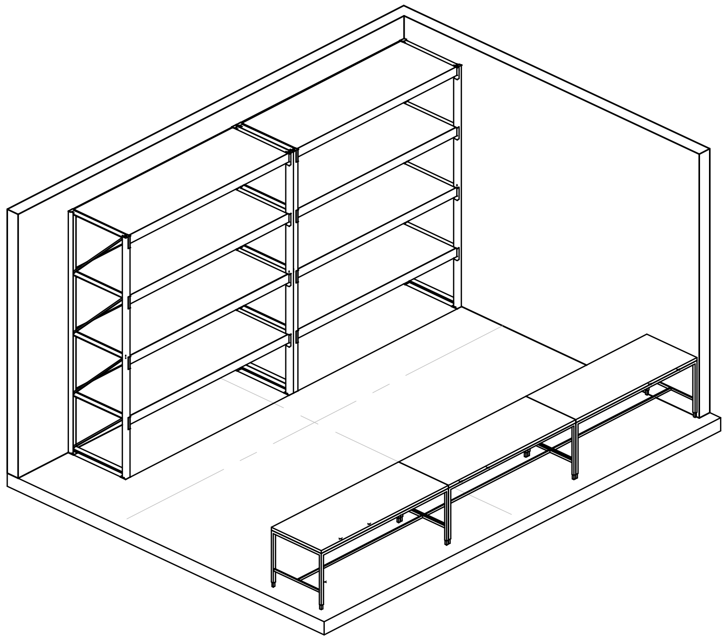
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A63	STORAGE SHELVING, INDUSTRIAL	U54	POWER, 120V., WIREWAY
A64	WORKBENCH, MOBILE	U60	UNDERSHELF TASK LIGHT
		U62	DATA, WIREWAY

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 8, 20/05/2021		SPACE ID #: 5.1		**RDS: 052-3**
DEPARTMENTS / GROUP NAME: TSTS	SPACE TYPE: LOGISTICS / SUPPORT			**SPACE NAME: TSTS SHIPPING AND RECEIVING**
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 8, 20/05/2021	**DEPARTMENTS / GROUP NAME: TSB**	**SPACE TYPE: LOGISTICS / SUPPORT**	**NUMBER OF PEOPLE: 10**	**SPACE ID#: 5.4**	**RDS-055-1**
CHIEF SCIENTIST: Martin Breton	**ADDITIONAL USER COMMENTS:**			**AREA (m2): 71.44**	**Space Name: UNIVERSAL LOCKER ROOM & CLEAN ROOM**
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			**OPERATING HOURS: 8AM-5PM**		

ROOM FUNCTION AND ACTIVITES:

A Universal Locker Room is required to be inclusive and meet the needs of a variety of users who require more privacy, gender anonymity, accessibility, assistance or space.
The design of this room includes locker areas, change areas, shower and restroom facilities. A separate area for a washer/dryer has also been provided.

ARCHITECTURAL

FLOORING

FLOOR FINISH: TILE FLOOR C/W TILE FLOOR BASE

WALL SYSTEM

PARTITION TYPE: MASONRY
ACOUSTIC LEVEL: SPEECH SECURE

CEILING

CEILING FINISH: Gypsum w/ epoxy paint
CEILING HEIGHT: 3000mm (10'-0") Min.

CASEWORK / MILLWORK

COUNTERTOP FOR HAND WASH SINKS
LOCKERS (12)
BENCH (12)

WINDOWS / DAYLIGHTING

DOORS/ HARDWARES

DOOR TYPE: HOLLOW METAL PAINTED
DOOR HARDWARE: KEYED OR SWIPE CARD
DOOR WIDTH (min): 1100mm
DOOR HARDWARE: ACOUSTIC SEALS
ROOM SCHEDULER

SUSTAINABILITY REQUIREMENT

OTHER / COMMENTS: UNOCCUPIED TEMPERATURE SETBACKS NOT PREFERRED DUE TO ONGOING TESTING DURING UNOCCUPIED PERIODS

SPECIAL DESIGN CONDITIONS

ACCESSIBILITY REQUIREMENT

PLUMBING

MULTI-USER AND SINGLE BASIN HAND WASH SINKS W/ TOUCHLESS FAUCET
WALL HUNG WATER CLOSET, FLUSH VALVE
SHOWER FIXTURE
WALL BOX FOR LAUNDRY WASHER

MECHANICAL

SETPOINTS 24C +/- 1C SUMMER, 22C +/- 1C WINTER
DEMAND CONTROL VENTILATION
30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER
ROOM TEMPERATURE CONTROL
ZONE HUMIDITY CONTROL
SCHEDULED NIGHT SETBACK
ROOM PRESSURIZATION, NEGATIVE/NOT MONITORED
VENT & LINT TRAP FOR LAUNDRY DRYER
HEATING/COOLING TERMINAL SYSTEM PENDING ANALYSIS
MECHANICAL NOISE (DECIBELS / NC): NC40

HAZARD - CHEMICAL & BIOLOGICAL, TRACE AMOUNTS FROM WORKING ON EVIDENCE AND DECONTAMINATION

FIRE PROTECTION / ALARM

WET PIPE SPRINKLER SYSTEM
VISUAL/AUDIBLE ALARM SIGNALS TO NBCC

ELECTRICAL / POWER

NORMAL POWER
208V / XXX / 3 PHASE

LIGHTING

OCCUPANCY/VACANCY SENSING
RECESSED LIGHTING
4000K COLOUR TEMP

SECURITY

Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

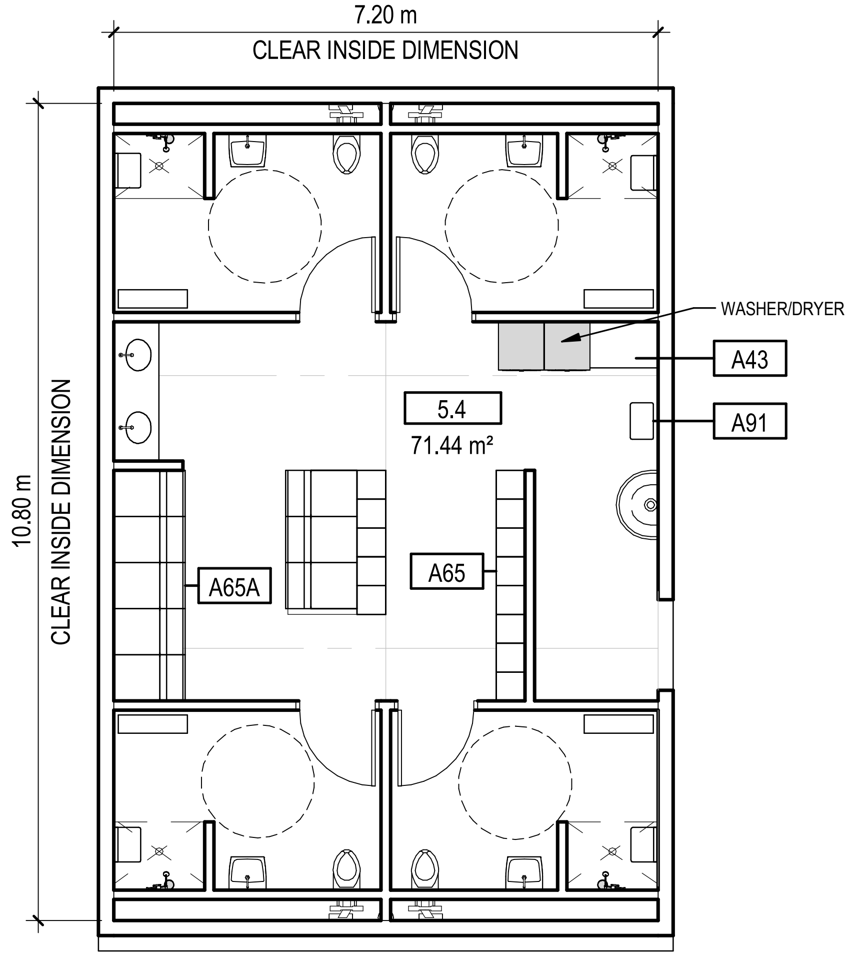
COMMUNICATIONS

PUBLIC PAGING
WIRELESS COVERAGE

STRUCTURAL

FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa

REVISION # & ISSUE DATE: REV 8, 20/05/2021		SPACE ID #: 5.4	RDS: 055-2
DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LOGISTICS / SUPPORT		SPACE NAME: UNIVERSAL LOCKER & CLEAN ROOM
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY TSB HIGH BAY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



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055-2

5.4 - UNIVERSAL LOCKER & CLEAN ROOM

1 : 100

LEGEND

ARCHITECTURAL SYSTEMS

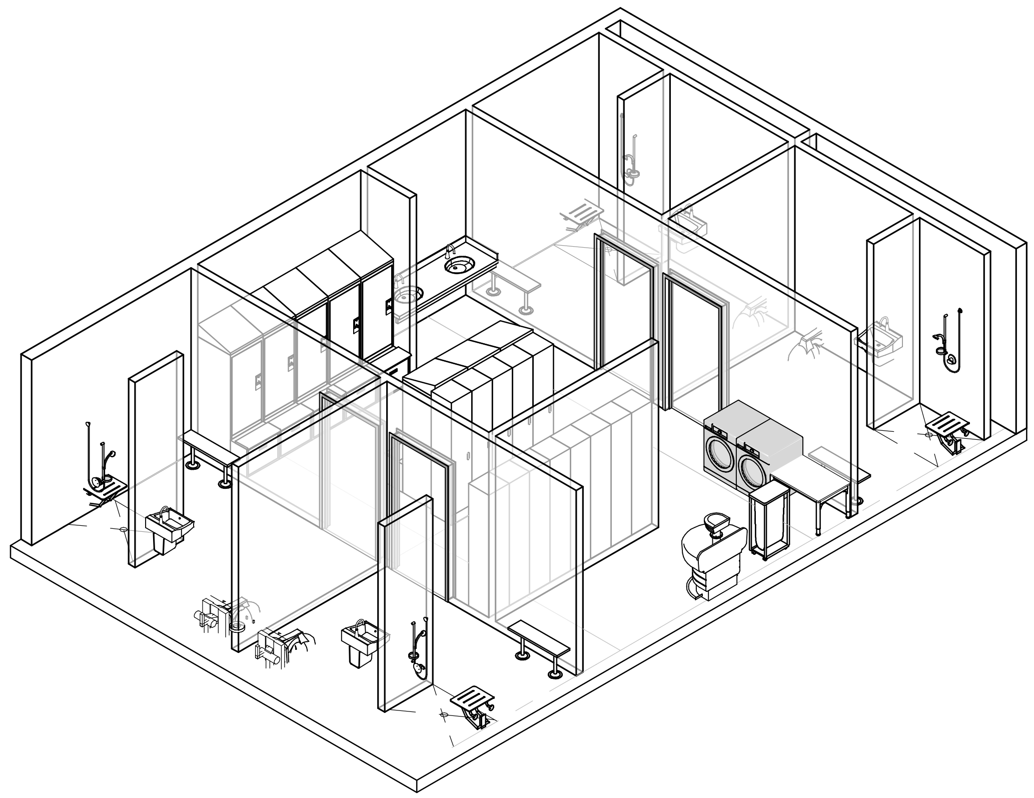
A43	CASEWORK, MODULAR LEG FRAMED
A65	LOCKERS, FIXED
A65A	LOCKERS, OVERSIZED WITH BENCH
A91	SOILED LINEN HAMPER
A103	BENCH, LOCKEROOM

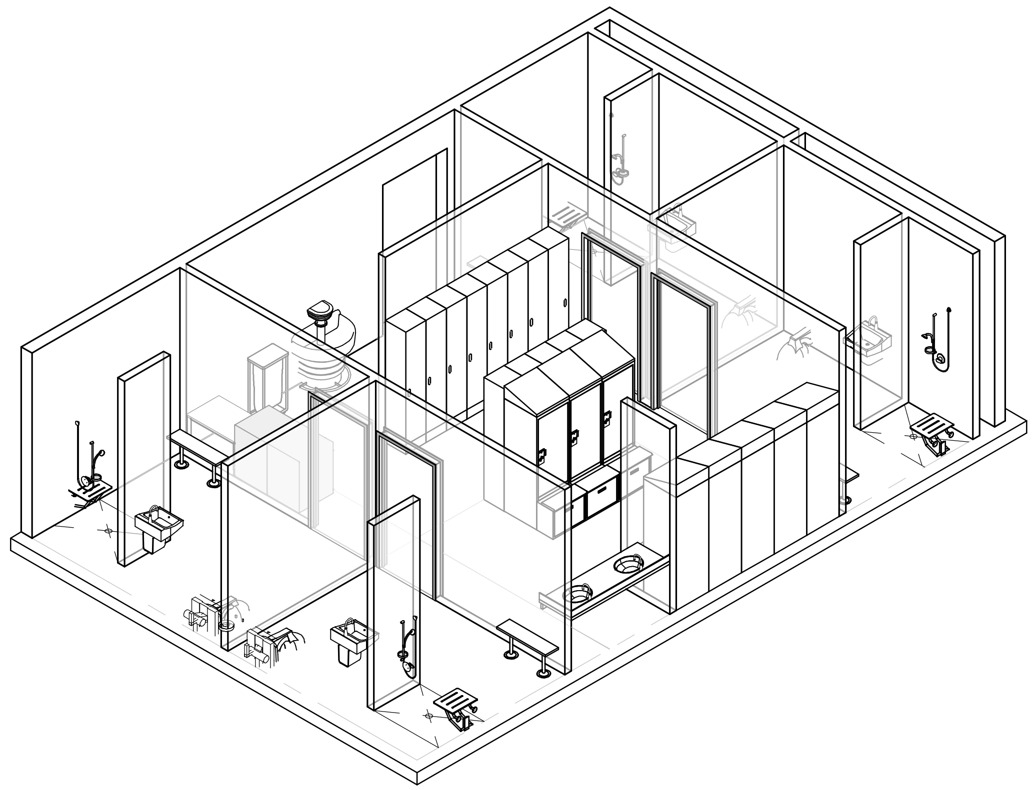
UTILITIES / SYSTEMS

U37	SHOWER FIXTURE
U39	WALL HUNG WATER CLOSET, FLUSH VALVE
U43	SINK, HANDWASH
U44	SINK, HANDWASH, MULTI-USER

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 8, 20/05/2021		SPACE ID #: 5.4		RDS: 055-3
DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LOGISTICS / SUPPORT	LAB CERTIFICATION REQUIREMENTS:		SPACE NAME: UNIVERSAL LOCKER & CLEAN ROOM
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY TSB HIGH BAY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 7, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LOGISTICS / SUPPORT	NUMBER OF PEOPLE: 6	SPACE ID#: 5.5	RDS-056-1
CHIEF : Martin Breton	ADDITIONAL USER COMMENTS:			AREA (m2): 74.34	Space Name: PROTECTIVE PERSONAL EQUIPMENT STORAGE
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			OPERATING HOURS: 8AM-5PM		

ROOM FUNCTION AND ACTIVITES:

PPE equipment and storage room complete with storage shelving and open area for putting on equipment. Lockers for 19 TSB Eng and 32 TSB HO

ARCHITECTURAL

FLOORING

FLOOR FINISH: CONCRETE (SMOOTH & SEALED FINISH), RUBBER FLOOR BASE

WALL SYSTEM

PARTITION TYPE: MASONRY
ACOUSTIC LEVEL: SPEECH SECURE

CEILING

CEILING FINISH: ACOUSTIC PANEL
CEILING HEIGHT: 3000mm (10'-0") Min.

CASEWORK / MILLWORK

CLOSED STORAGE SHELVING (9)
LOCKERS (47)
ADJUSTABLE HEIGHT TABLE (4)

WINDOWS / DAYLIGHTING

DOORS/ HARDWARES

DOOR TYPE: WOOD, GLAZED
DOOR HARDWARE: KEYED OR SWIPE CARD
DOOR WIDTH (min): 1800mm
DOOR HARDWARE: ACOUSTIC SEALS
ROOM SCHEDULER

SUSTAINABILITY REQUIREMENT

SPECIAL DESIGN CONDITIONS

ACCESSIBILITY REQUIREMENT

PLUMBING

DRAINS AND/OR FIXTURES NOT EXPECTED

MECHANICAL

SETPOINTS 24C +/- 1C SUMMER, 22C +/- 1C WINTER
DEMAND CONTROL VENTILATION
30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER
ROOM TEMPERATURE CONTROL
ZONE HUMIDITY CONTROL
SCHEDULED NIGHT SETBACK
ROOM PRESSURIZATION, NEGATIVE/NOT MONITORED
HEATING/COOLING TERMINAL SYSTEM PENDING ANALYSIS
MECHANICAL NOISE (DECIBELS / NC): NC40

FIRE PROTECTION / ALARM

WET PIPE SPRINKLER SYSTEM
VISUAL/AUDIBLE ALARM SIGNALS TO NBCC

ELECTRICAL / POWER

NORMAL POWER
208V / XXX / 3 PHASE

LIGHTING

OCCUPANCY/VACANCY SENSING
RECESSED LIGHTING
4000K COLOR TEMPERATURE

SECURITY

Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

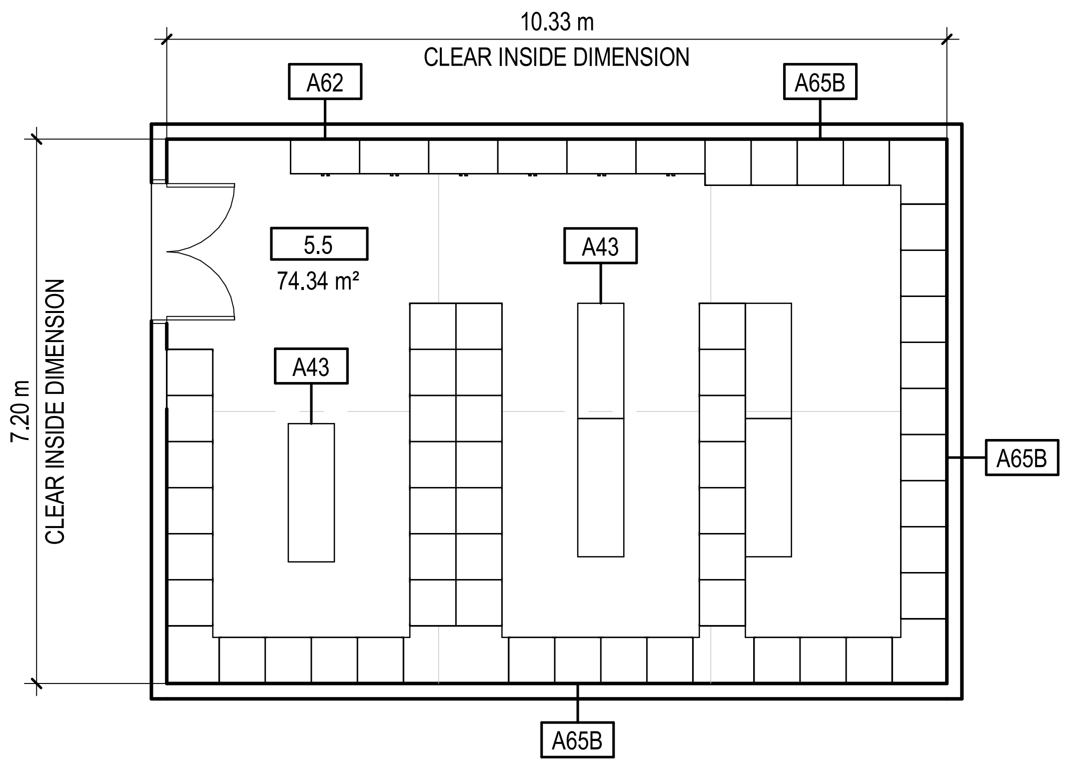
COMMUNICATIONS

PHONE CONNECTION
PUBLIC PAGING
WIRELESS COVERAGE
CABLE TRAY ABOVE CEILING

STRUCTURAL

FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 5.5	**RDS: 056-2**
DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LOGISTICS / SUPPORT		**SPACE NAME: PROTECTIVE PERSONAL EQUIPMENT STORAGE**
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY TSB HIGH BAY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



5.5 - PROTECTIVE PERSONAL EQUIPMENT STORAGE

1 / 056-2 — 1 : 100

LEGEND

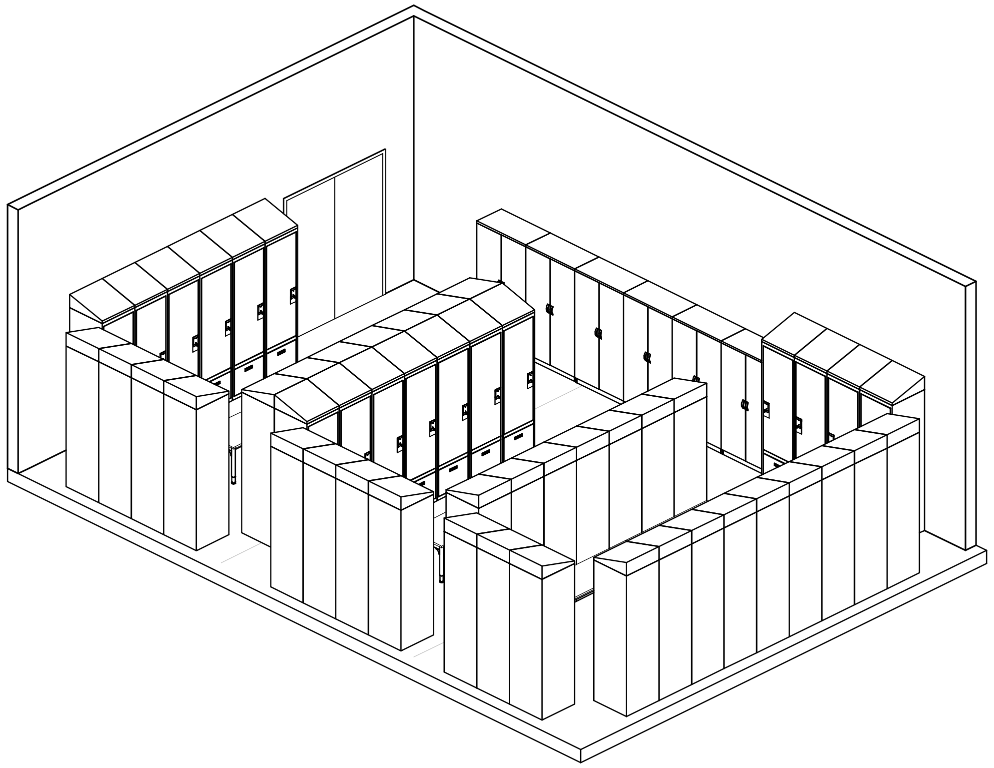
ARCHITECTURAL SYSTEMS

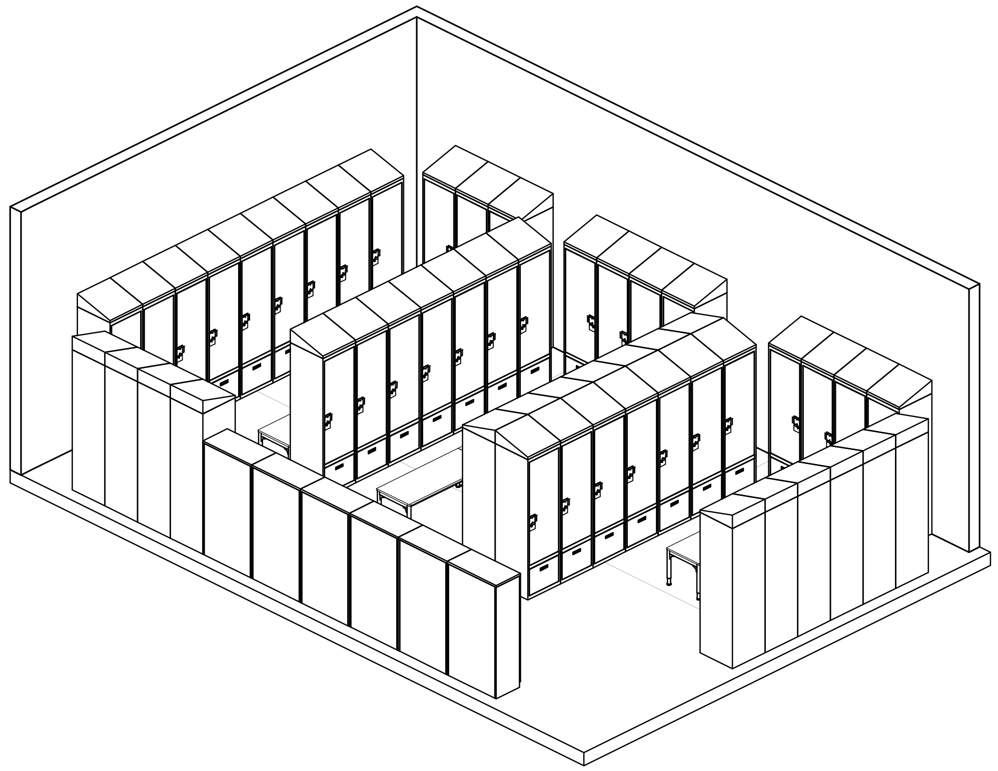
A43	CASEWORK, MODULAR LEG FRAMED
A62	STORAGE SHELVING, TALL, CLOSED
A65B	LOCKERS, OVERSIZED

UTILITIES / SYSTEMS

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 7, 20/05/2021		SPACE ID #: 5.5	**RDS: 056-3**
DEPARTMENTS / GROUP NAME: TSB	SPACE TYPE: LOGISTICS / SUPPORT	LAB CERTIFICATION REQUIREMENTS:	**SPACE NAME: PROTECTIVE PERSONAL EQUIPMENT STORAGE**
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: TSB HIGH BAY — SECONDARY ADJACENCY: — TERTIARY ADJACENCY:		





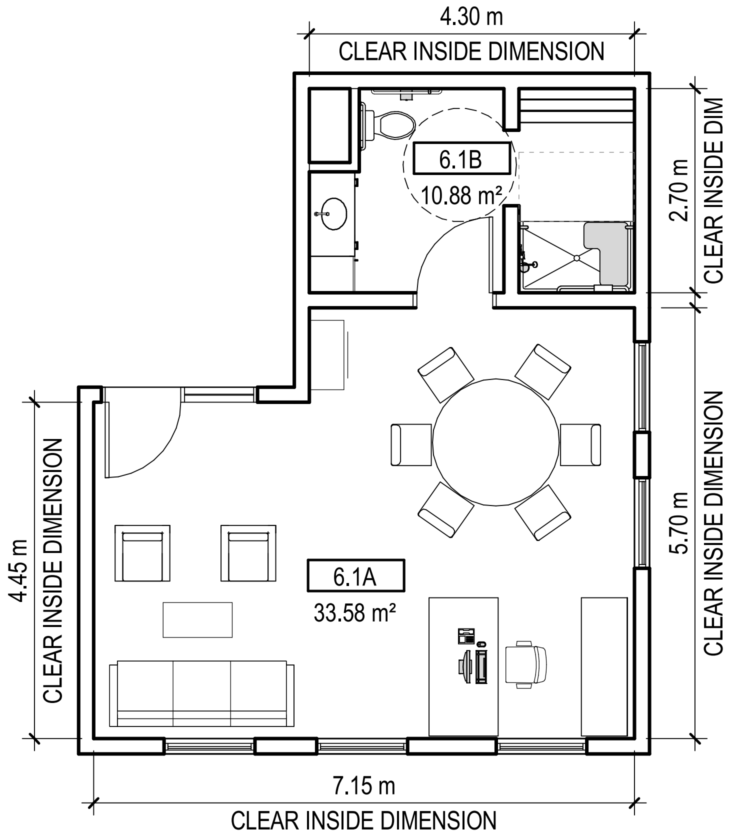
REVISION # & ISSUE DATE: REV 5, 20/05/2021	**DEPARTMENTS / GROUP NAME: TSB HO**	**SPACE TYPE: ADMIN / OFFICE**	**NUMBER OF PEOPLE: 1-10**	**SPACE ID#: 6.1**	**RDS-057-1**
CHIEF : ________________________________	**ADDITIONAL USER COMMENTS:**			**AREA (m2): 37.19+10.88= 48.07**	**OFFICE OF THE CHAIR (DM)**
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			**OPERATING HOURS: 8AM-5PM**		

ROOM FUNCTION AND ACTIVITES:

ENCLOSED OFFICE FOR INDIVIDUAL WORK OR HAVE A POSSIBILLITY TO ALLOW FOR SMALL MEETINGS + THREE PIECE ACCESSIBLE WASHROOM

ARCHITECTURAL		
FLOORING FLOOR FINISH: OFFICE - CARPET TILE FLOOR FINISH: WASHROOM - RESILIENT SHEET OR CERAMIC TILE. FLOOR BASE: RUBBER/CERAMIC TILE	**SUSTAINABILITY REQUIREMENT**	**FIRE PROTECTION / ALARM** WET PIPE SPRINKLER SYSTEM VISUAL/AUDIBLE ALARM SIGNALS TO NBCC
WALL SYSTEM OFFICE - GYPSUM BOARD PARTITION (PAINT FINISH) OR DEMOUNTABLE PARTITIONS WASHROOM - GYPSUM BOARD PARTITION (PAINT FINISH, CERAMIC TILE IN SHOWER SURROUND AND ABOVE BASIN) ACOUSTIC LEVEL: SPEECH SECURE NOTE: CLIENT RESERVES RIGHT TO INSPECT PRIOR TO FINAL FINISH / CLOSING OF WALL TO TEST STC CAPABILITY (STANDARD ACHIEVED)	**SPECIAL DESIGN CONDITIONS** ARCHITECTURAL REQUIREMENTS: REUSABLE PARTITION SYSTEMS - DEMOUNTABLE PARTITIONS ARE ACCEPTABLE IF THEY MEET THE REQUIREMENTS AND PROVIDE THE BEST ENVIRONMENT AND ECONOMIC VALUE TO THE CROWN NOTE: DM OFFICES REQUIRING SECURE SPEECH PRIVACY, AS DETERMINED BY A THREAT AND RISK ASSESSMENT (TRA) - PROVIDE SLAB TO SLAB CONSTRUCTION WITH INSULATION (APPROXIMATELY STC 52) (IF SECURE SPEECH PRIVACY REQUIRED, ADD A 3sq.m. VESTIBULE.	**ELECTRICAL / POWER** OFFICE: SIX (6) STANDARD ELECTRICAL DUPLEX RECEPTACLES ON TWO CIRCUITS GFCI RECEPTACLE IN WASHROOM 120V NORMAL POWER ENHANCED SPEECH PRIVACY - STC 45. GENERAL SOUND MASKING SYSTEM
CEILING ACOUSTIC CEILING TILE (3000mm AFF)	**ACCESSIBILITY REQUIREMENT**	**LIGHTING** OCCUPANCY/VACANCY SENSING RECESSED LIGHTING 3500K RECESSED SHOWER DOWNLIGHT VANITY LIGHT
CASEWORK / MILLWORK WASHROOM: COUNTER AND STORAGE	**PLUMBING** 3-PIECE WASHROOM: WATER CLOSET, SINK & BUILT-IN SHOWER W/ FLOOR DRAIN SINGLE POINT FLOOR DRAIN IN WASHROOM	**SECURITY** OFFICE LOCK SET Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.
WINDOWS / DAYLIGHTING NATURAL DAYLIGHTING PREFERRED, OPERABLE WINDOW C/W SHADE CONTROL	**MECHANICAL** SETPOINTS 25C +/- 1C SUMMER, 21C +/- 1C WINTER DEMAND CONTROL VENTILATION 30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER ROOM TEMPERATURE CONTROL ZONE HUMIDITY CONTROL SCHEDULED NIGHT SETBACK ROOM PRESSURIZATION, POSITIVE/NOT MONITORED HEATING/COOLING TERMINAL SYSTEM PENDING ANALYSIS MECHANICAL NOISE: NC30	**COMMUNICATIONS** PHONE CONNECTION DATA CONNECTION WIFI CABLE TC CONNECTION (SMART TV/BOARD, CAMERA, VIDEOCONFERENCING, ABILITY TO RUN PRESENTATIONS
DOORS/ HARDWARES DOOR TYPE: WOOD, GLAZING ON SIDELIGHT - CLEAR TEMPERED GLASS OR FILM DOOR WIDTH (min):1000mm WITH 915mm SIDELIGHT, 1000mm DOOR HARDWARE: ACOUSTIC SEALS		**STRUCTURAL** FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa

REVISION # & ISSUE DATE: REV 5, 20/05/2021		SPACE ID #: 6.1	RDS: 057-2
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN		SPACE NAME: OFFICE OF THE CHAIR (DM)
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



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057-2

6.1 - CHAIR (DEPUTY MINISTER EQUIVALENT)

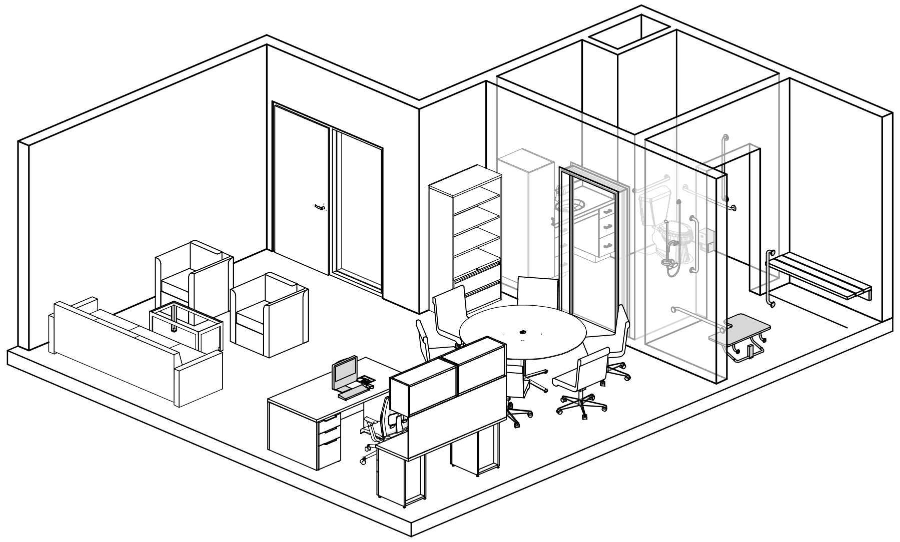
1 : 100

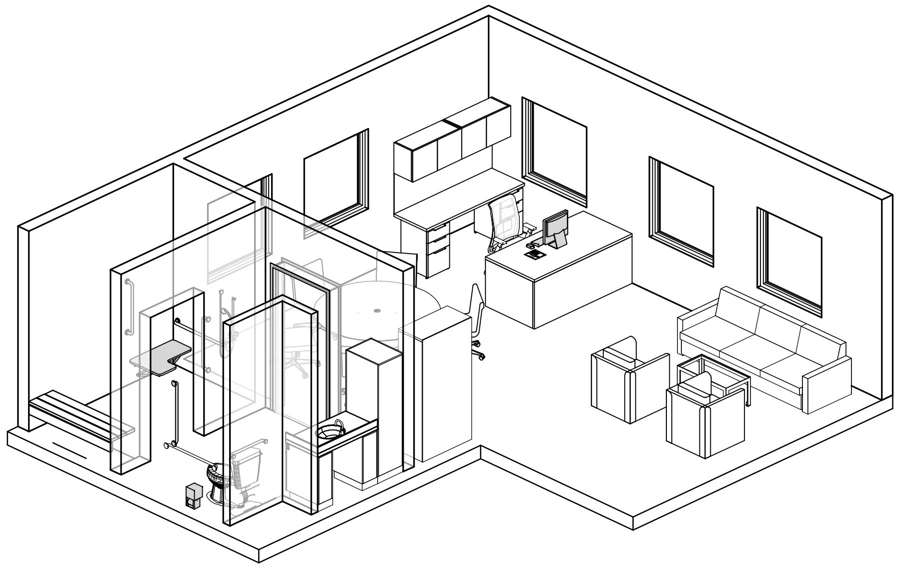
LEGEND

ARCHITECTURAL SYSTEMS	UTILITIES / SYSTEMS

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 5, 20/05/2021		SPACE ID #: 6.1		**RDS: 057-3**
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: OFFICE OF THE CHAIR (DM)**
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 5, 20/05/2021	**DEPARTMENTS / GROUP NAME: TSB HO**	**SPACE TYPE: ADMIN / OFFICE**	**NUMBER OF PEOPLE: 1 - 5**	**SPACE ID#: 6.2**	**RDS-058-1**
CHIEF : ________________________________	**ADDITIONAL USER COMMENTS:**			**AREA (m2): 18.5**	**Space Name: MEMBERS OF BOARD OFFICES**
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			**OPERATING HOURS: 8AM-5PM**		

ROOM FUNCTION AND ACTIVITES:

ENCLOSED OFFICE FOR INDIVIDUAL WORK OR HAVE A POSSIBILLITY TO ALLOW FOR SMALL MEETINGS

ARCHITECTURAL

FLOORING

FLOOR FINISH: OFFICE - CARPET TILE
FLOOR BASE: RUBBER

WALL SYSTEM

OFFICE - GYPSUM BOARD PARTITION (PAINT FINISH) OR DEMOUNTABLE PARTITIONS
ACOUSTIC LEVEL: SPEECH SECURE
PARTITION: SLAB TO UNDERSIDE OF CEILING WITH INSULATION AND PLENUM BARRIERS, ENHANCED SPEECH PRIVACY TO ACHIEVE STC 45.

CEILING

ACOUSTIC CEILING TILE (3000mm AFF)

CASEWORK / MILLWORK

N/A

WINDOWS / DAYLIGHTING

NATURAL DAYLIGHTING PREFERRED, OPERABLE WINDOW C/W SHADE CONTROL

DOORS/ HARDWARES

DOOR TYPE: WOOD, GLAZING ON SIDELIGHT - CLEAR TEMPERED GLASS OR FILM
DOOR WIDTH (min): 1000mm WITH 915mm SIDELIGHT
DOOR HARDWARE: ACOUSTIC SEALS

SUSTAINABILITY REQUIREMENT

SPECIAL DESIGN CONDITIONS

ACCESSIBILITY REQUIREMENT

PLUMBING

DRAINS AND/OR FIXTURES NOT EXPECTED

MECHANICAL

SETPOINTS 25C +/- 1C SUMMER, 21C +/- 1C WINTER
VAV TERMINAL UNIT FOR DCV
30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER
ROOM TEMPERATURE CONTROL
ZONE HUMIDITY CONTROL
SCHEDULED NIGHT SETBACK
ROOM PRESSURIZATION, POSITIVE/NOT MONITORED
HEATING/COOLING TERMINAL SYSTEM PENDING ANALYSIS
MECHANICAL NOISE: NC30

FIRE PROTECTION / ALARM

WET PIPE SPRINKLER SYSTEM
VISUAL/AUDIBLE ALARM SIGNALS TO NBCC

ELECTRICAL / POWER

SOUND MASKING SYSTEM (ENHANCED SPEECH PRIVACY - STC 45)
FOUR (4) STANDARD ELECTRICAL DUPLEX RECEPTACLES (2 CIRCUITS)
120V NORMAL POWER

LIGHTING

OCCUPANCY/VACANCY SENSING
RECESSED LIGHTING
3500K

SECURITY

OFFICE LOCK SET
Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

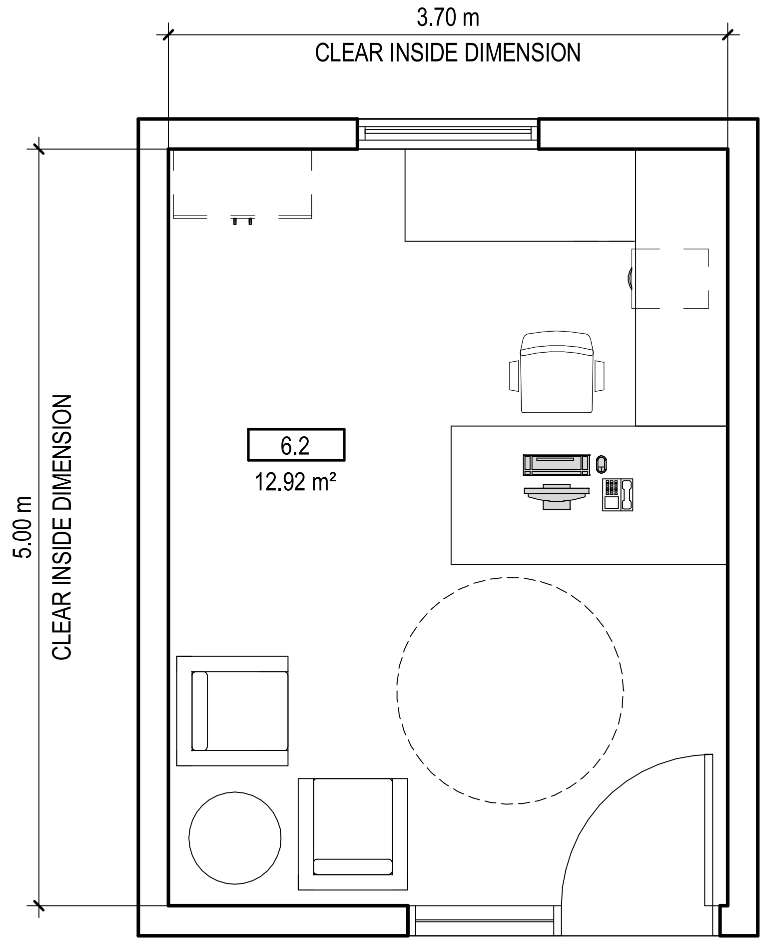
COMMUNICATIONS

PHONE CONNECTION
DATA CONNECTION
WIFI

STRUCTURAL

FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa

REVISION # & ISSUE DATE: REV 5, 20/05/2021		SPACE ID #: 6.2	RDS: 058-2
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN		SPACE NAME: MEMBERS OF BOARD OFFICES
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



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058-2

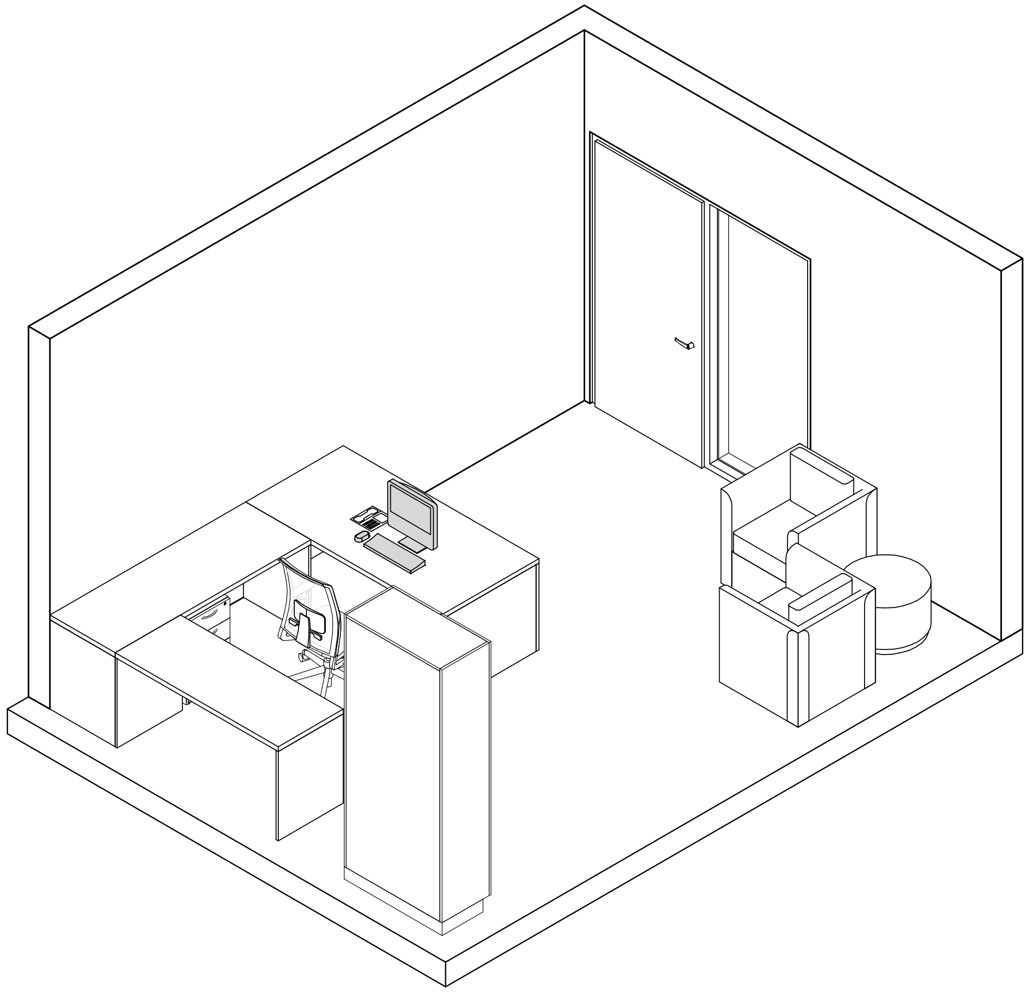
6.2 - MEMBERS OF BOARD & COO OFFICE

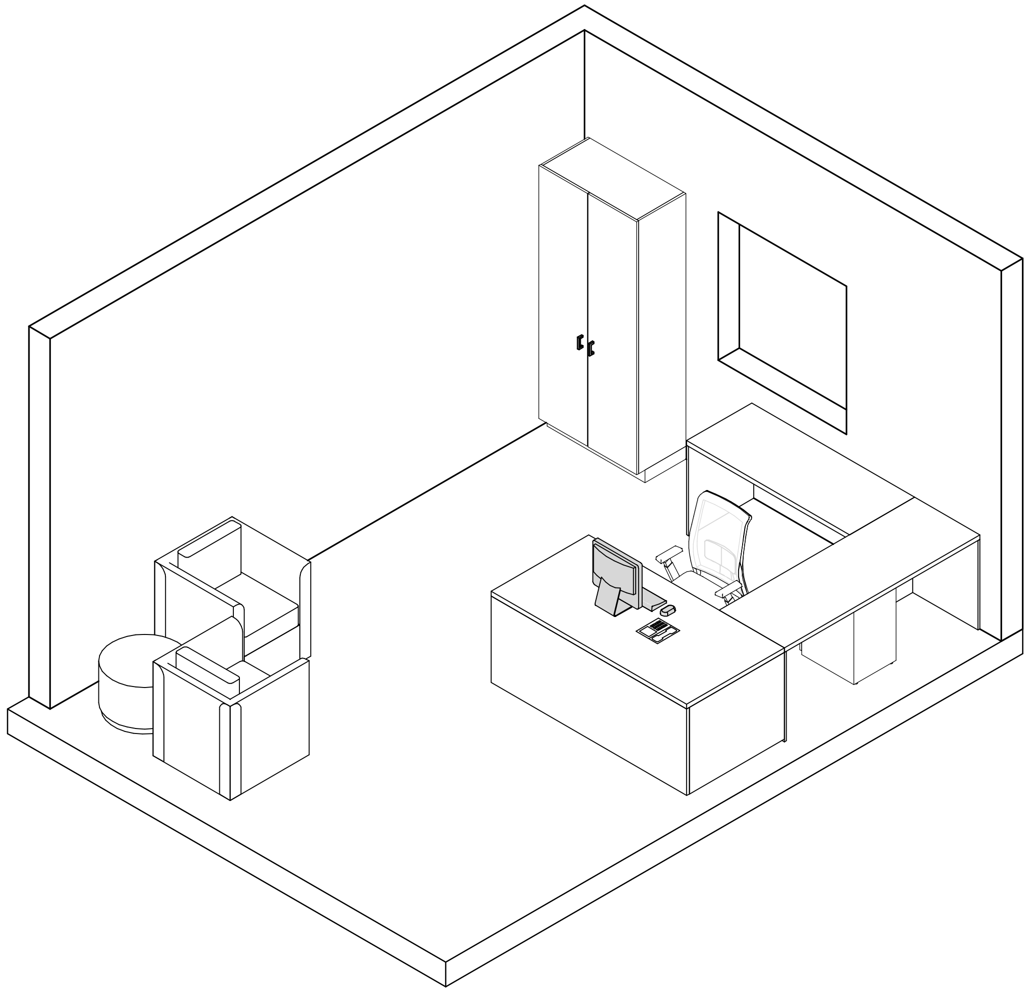
1 : 50

LEGEND	
ARCHITECTURAL SYSTEMS	UTILITIES / SYSTEMS

SPECIALTY EQUIPMENT	

REVISION # & ISSUE DATE: REV 5, 20/05/2021		SPACE ID #: 6.2		**RDS: 058-3**
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: MEMBERS OF BOARD OFFICES**
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS	NUMBER OF PEOPLE: 1 - 4	SPACE ID#: 10.1	**RDS-076-1**
CHIEF : ______________________________	ADDITIONAL USER COMMENTS:			AREA (m2): 61.2	**Space Name: RECORDS / FILING**
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			OPERATING HOURS: 8AM-5PM		

ROOM FUNCTION AND ACTIVITES:

RECORDS/FILING C/W HIGH DENSITY SHELVING AND MOBILE STORAGE
THE SPACE OPTIMIZATION RECOMMENDATION IS TO PROVIDE MOBILE HIGH DENSITY SHELVING WHICH REDUCES APPROXIMATELY 30% OF TRADITIONAL SPACE REQUIRED BY SHELVING UNITS.
THE VOLUME REQUIRED IS 476.6 LINEAL METRES REDUCED FROM CURRENT HOLDINGS OF 620 LINEAL METRES.
PROVIDE SPACE FOR SHREDDER, PAPER DRILL ON TABLE, BOX STORAGE AND ONE (1) COMBINATION LOCK FILE CABINET
ALSO REQUIRES DIRECT ACCESS TO RECORDS STAFF WORK STATIONS

ARCHITECTURAL

FLOORING
FLOOR FINISH: CARPET TILE
FLOOR BASE: RUBBER

WALL SYSTEM
GYPSUM BOARD PARTITION (PAINT FINSH)

CEILING
ACOUSTIC TILE (3000 mm AFF)

CASEWORK / MILLWORK

WINDOWS / DAYLIGHTING
N/A

DOORS/ HARDWARES
DOOR TYPE: WOOD
DOOR WIDTH (min): 1000mm
DOOR HARDWARE: ACOUSTIC SEALS

SUSTAINABILITY REQUIREMENT

SPECIAL DESIGN CONDITIONS

ACCESSIBILITY REQUIREMENT

PLUMBING

DRAINS AND/OR FIXTURES NOT EXPECTED

MECHANICAL

SETPOINTS 25C +/- 1C SUMMER, 21C +/- 1C WINTER
DEMAND CONTROL VENTILATION
30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER
ROOM TEMPERATURE CONTROL
ZONE HUMIDITY CONTROL
SCHEDULED NIGHT SETBACK
ROOM PRESSURIZATION, NEUTRAL/NOT MONITORED
HEATING/COOLING TERMINAL SYSTEM PENDING ANALYSIS
MECHANICAL NOISE: NC30

FIRE PROTECTION / ALARM

WET PIPE SPRINKLER SYSTEM
VISUAL/AUDIBLE ALARM SIGNALS TO NBCC

ELECTRICAL / POWER

NORMAL POWER RECEPTACLES

LIGHTING

RECESSED LIGHTING
OCCUPANCY/VACANCY SENSOR
3500K

SECURITY

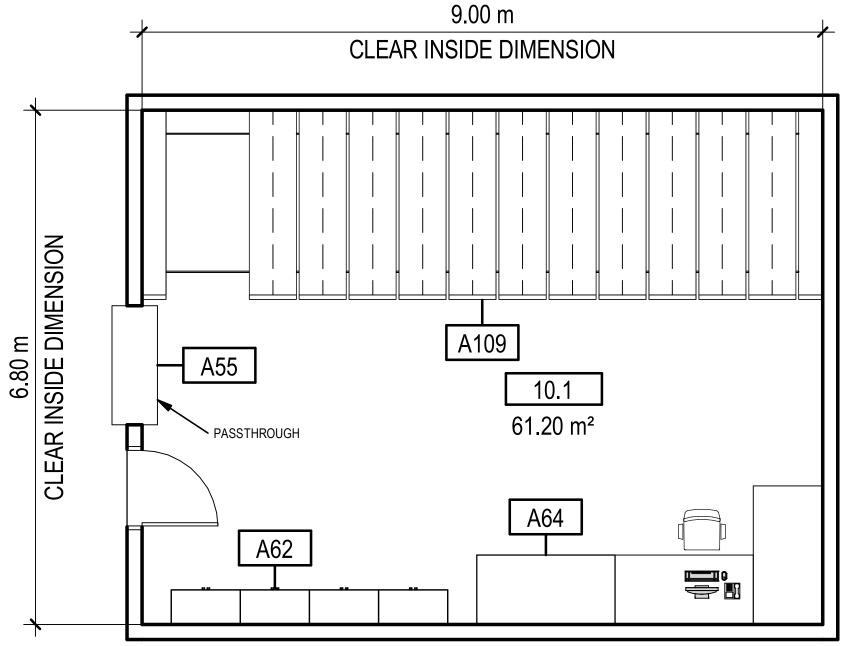
Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

COMMUNICATIONS

STRUCTURAL

FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICAITIONS (LIVE): 7.2 kPa
Storage system and capacity to be confirmed at SD

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 10.1	**RDS: 076-2**
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS		**SPACE NAME: RECORDS / FILING**
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



1 076-2 **10.1 - RECORDS / FILING**

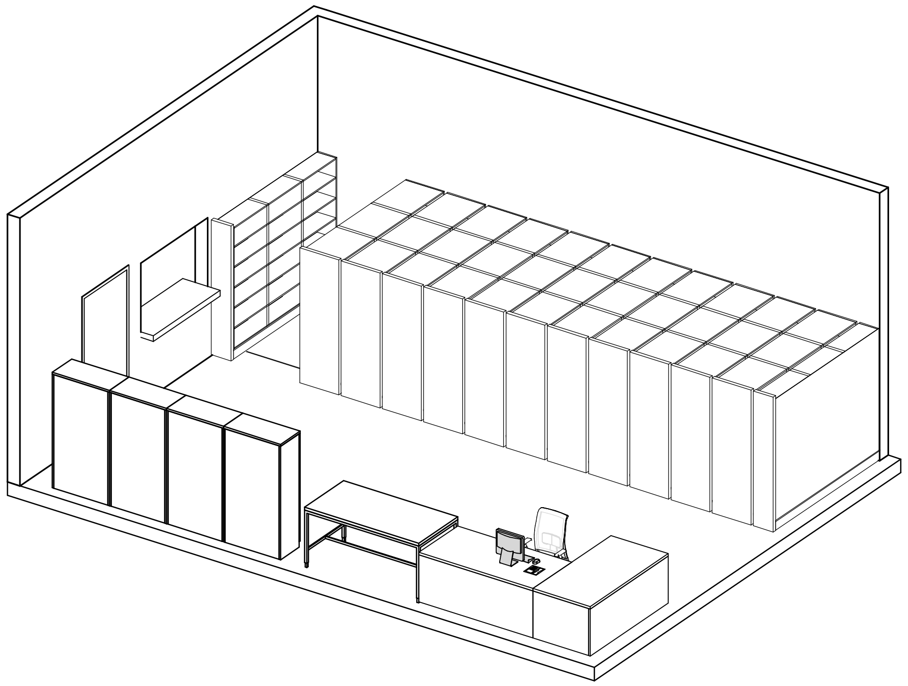
1 : 100

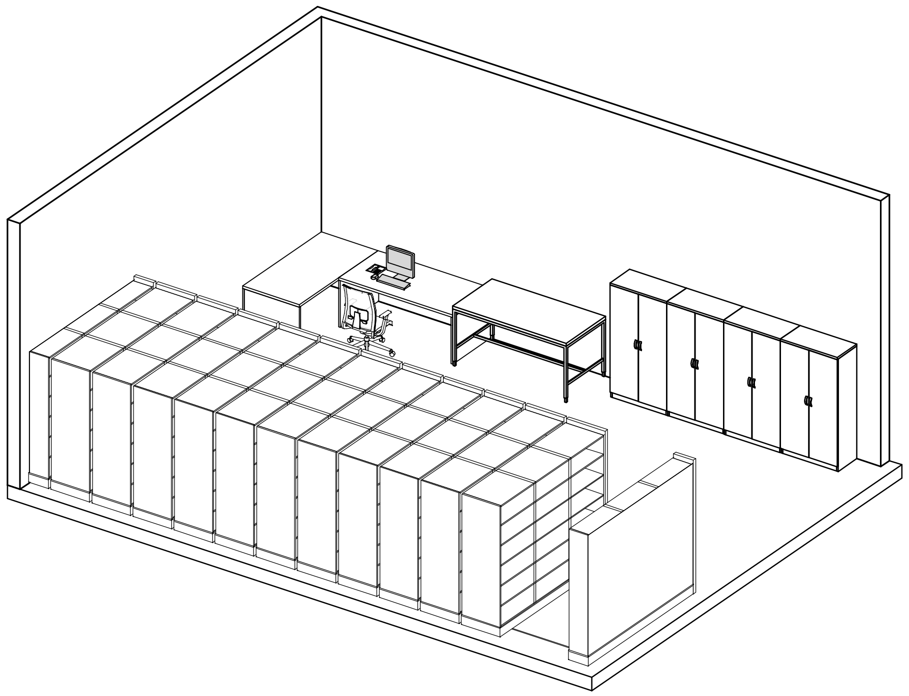
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A62	STORAGE SHELVING, TALL, CLOSED		
A64	WORKBENCH, MOBILE		
A109	HIGH DENSITY SHELVING		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 10.1	**RDS: 076-3**
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS		**SPACE NAME: RECORDS / FILING**
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		





REVISION # & ISSUE DATE: REV 6, 20/05/2021	**DEPARTMENTS / GROUP NAME: TSB HO**	**SPACE TYPE: ADMIN SPS**	**NUMBER OF PEOPLE:**	**SPACE ID#: 10.2**	**RDS-077-1**
CHIEF : ________________________________	**ADDITIONAL USER COMMENTS:**			**AREA (m2): 29.16**	**Space Name: SPECIAL CLOTHING EQUIPMENT STORAGE**
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			**OPERATING HOURS: 8AM-5PM**		

ROOM FUNCTION AND ACTIVITES:

SPECIAL CLOTHING EQUIPMENT ROOM C/W MOBILE SHELVING. SPACE TO ALSO ACCOMMODATE FOR SOME OFFICE FURNITURE STORAGE.

ARCHITECTURAL

FLOORING
FLOOR FINISH: CARPET TILE
FLOOR BASE: RUBBER

WALL SYSTEM
GYPSUM BOARD PARTITION (PAINT FINISH)

CEILING
ACOUSTIC TILE (3000 mm AFF)

CASEWORK / MILLWORK

WINDOWS / DAYLIGHTING
N/A

DOORS/ HARDWARES
DOOR TYPE: WOOD
DOOR WIDTH (min): 1000mm
DOOR HARDWARE: ACOUSTIC SEALS

SUSTAINABILITY REQUIREMENT

SPECIAL DESIGN CONDITIONS

ACCESSIBILITY REQUIREMENT

PLUMBING

DRAINS AND/OR FIXTURES NOT EXPECTED

MECHANICAL

SETPOINTS 25C +/- 1C SUMMER, 21C +/- 1C WINTER
DEMAND CONTROL VENTILATION
30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER
ROOM TEMPERATURE CONTROL
ZONE HUMIDITY CONTROL
SCHEDULED NIGHT SETBACK
ROOM PRESSURIZATION, NEUTRAL/NOT MONITORED
HEATING/COOLING TERMINAL SYSTEM PENDING ANALYSIS
MECHANICAL NOISE: NC30

FIRE PROTECTION / ALARM

WET PIPE SPRINKLER SYSTEM
VISUAL/AUDIBLE ALARM SIGNALS TO NBCC

ELECTRICAL / POWER

NORMAL POWER RECEPTACLES

LIGHTING

RECESSED LIGHTING
OCCUPANCY/VACANCY SENSOR
3500K

SECURITY

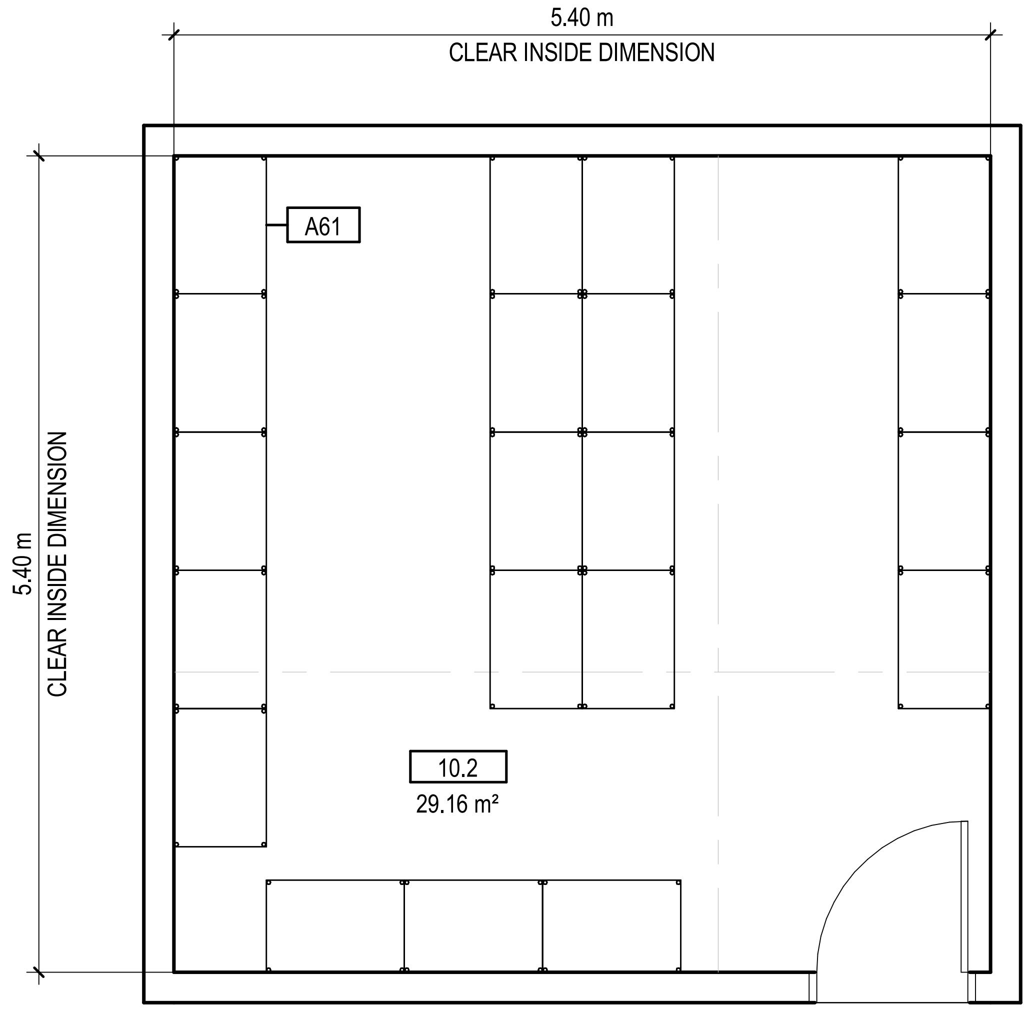
Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

COMMUNICATIONS

STRUCTURAL

FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICAITIONS (LIVE): 7.2 kPa

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 10.2	RDS: 077-2
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS		SPACE NAME: SPECIAL CLOTHING EQUIPMENT STORAGE
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



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077-2

10.2 - SPECIAL CLOTHING EQUIPMENT STORAGE

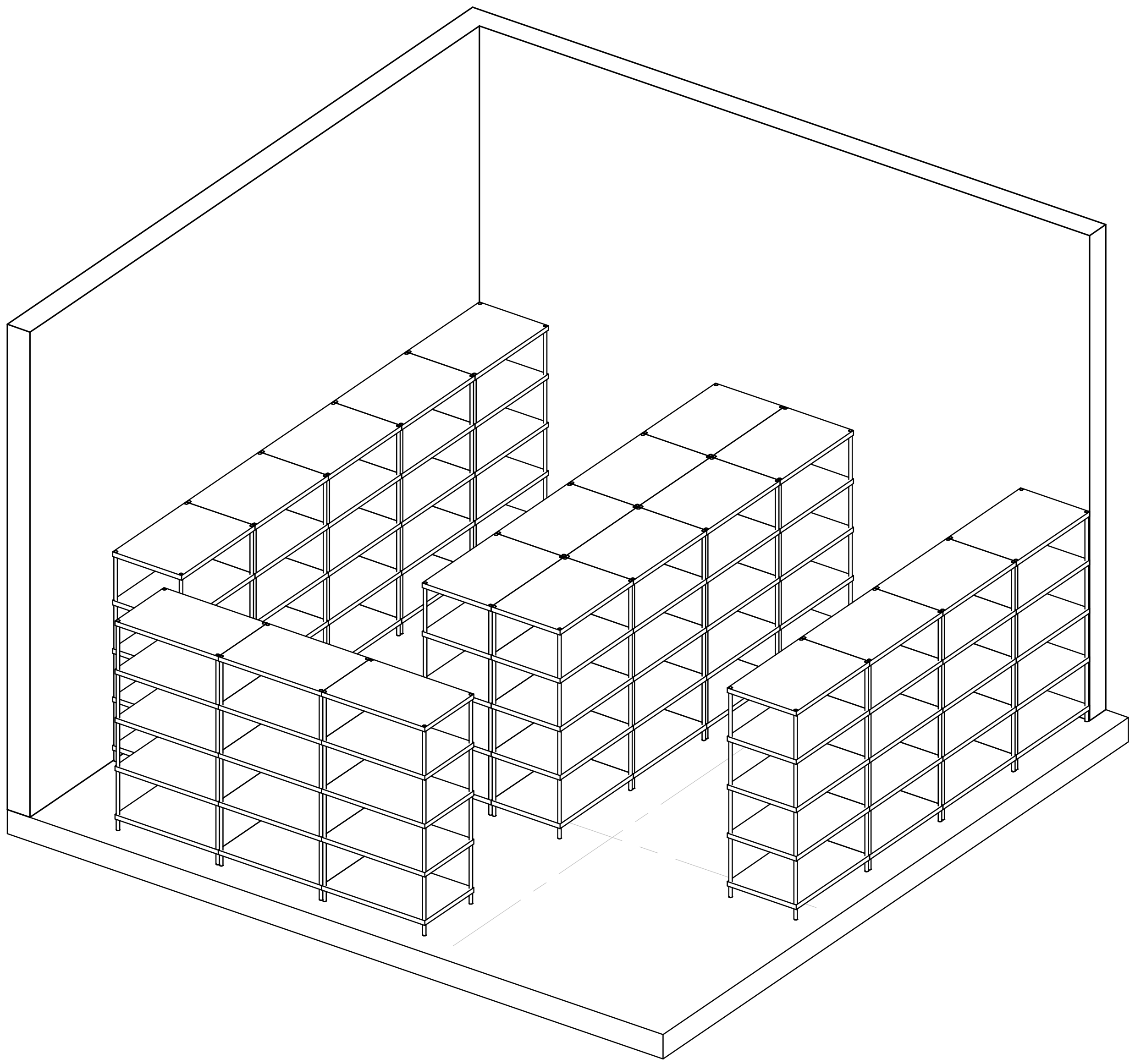
1 : 50

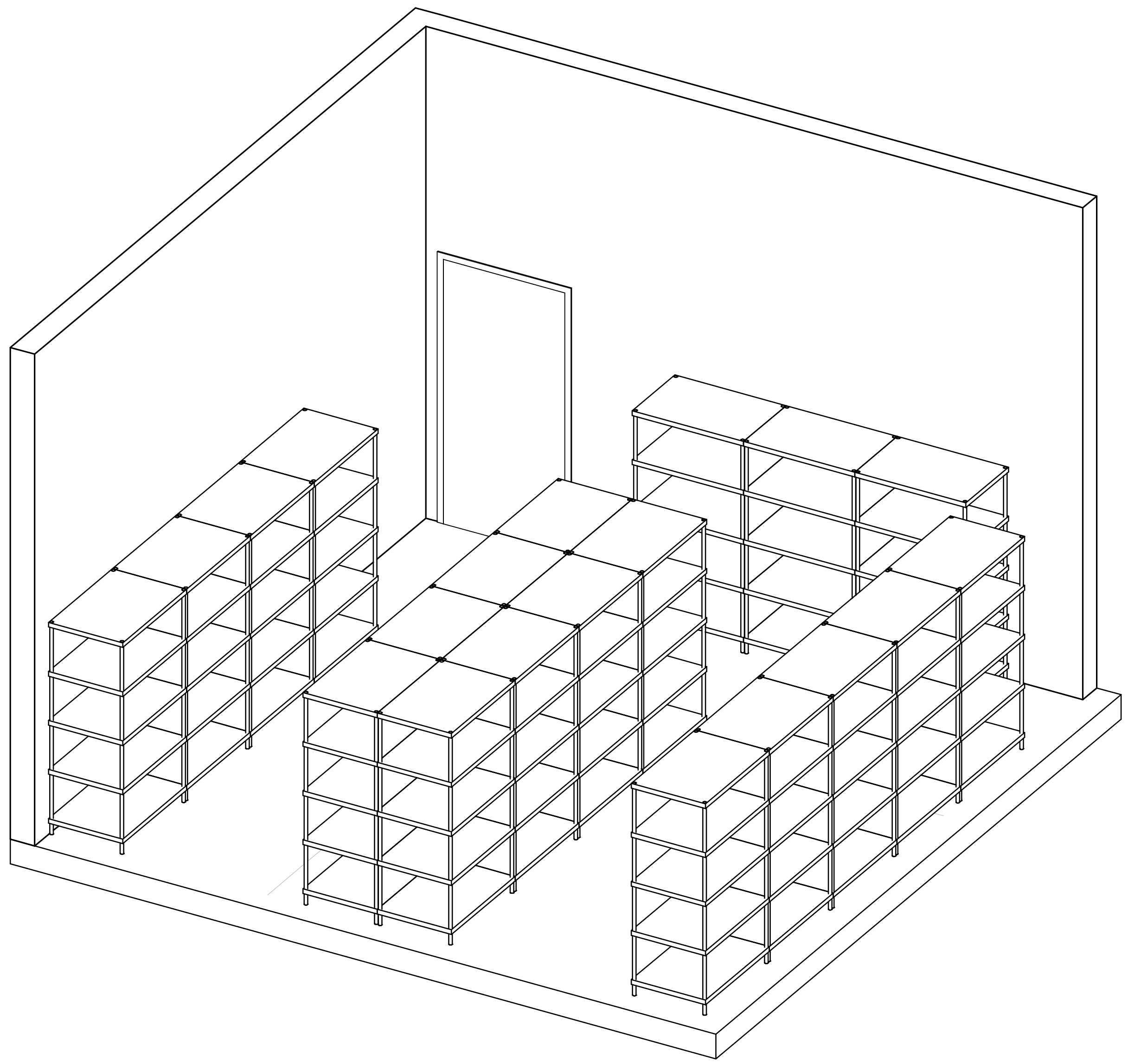
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A61	STORAGE SHELVING, TALL, OPEN 36"		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 10.2		**RDS: 077-3**
DEPARTMENTS / GROUP NAME: TSB HO + TSTS	SPACE TYPE: ADMIN SPS			**SPACE NAME: SPECIAL CLOTHING EQUIPMENT STORAGE**
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





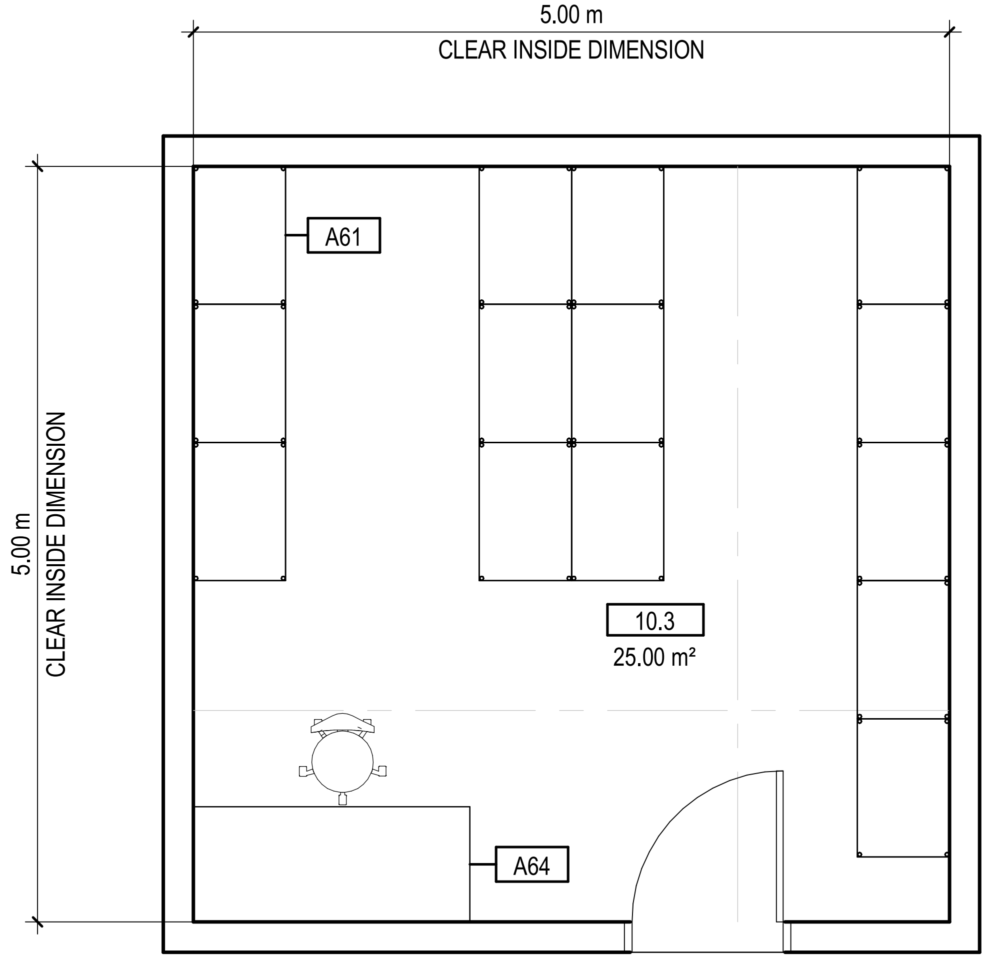
REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS	NUMBER OF PEOPLE:	SPACE ID#: 10.3	RDS-078-1
CHIEF : ______________________________	ADDITIONAL USER COMMENTS:			AREA (m2): 25	Space Name: IT EQUIPMENT STORAGE
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			OPERATING HOURS: 8AM-5PM		

ROOM FUNCTION AND ACTIVITES:

IT EQUIPMENT. STORAGE OF COMPUTERS AND PERIPHERALS COMPLETE WITH SOME ABILITY TO WORK ON/SETUP COMPUTERS/DEVICES.

ARCHITECTURAL	SUSTAINABILITY REQUIREMENT	FIRE PROTECTION / ALARM
FLOORING FLOOR FINISH: CARPET TILE FLOOR BASE: RUBBER		WET PIPE SPRINKLER SYSTEM VISUAL/AUDIBLE ALARM SIGNALS TO NBCC
WALL SYSTEM	**SPECIAL DESIGN CONDITIONS**	**ELECTRICAL / POWER**
GYPSUM BOARD PARTITION (PAINT FINISH)		NORMAL POWER RECEPTACLES EMERGENCY POWER RECEPTACLES
CEILING	**ACCESSIBILITY REQUIREMENT**	**LIGHTING**
ACOUSTIC TILE (3000 mm AFF)		SUSPENDED LIGHTING OCCUPANCY/VACANCY SENSOR 3500K
CASEWORK / MILLWORK	**PLUMBING**	**SECURITY**
	DRAINS AND/OR FIXTURES NOT EXPECTED	Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.
WINDOWS / DAYLIGHTING	**MECHANICAL**	**COMMUNICATIONS**
	SETPOINTS 25C +/- 1C SUMMER, 21C +/- 1C WINTER DEMAND CONTROL VENTILATOIN 30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER ROOM TEMPERATURE CONTROL ZONE HUMIDITY CONTROL SCHEDULED NIGHT SETBACK ROOM PRESSURIZATION, NEUTRAL/NOT MONITORED HEATING/COOLING TERMINAL SYSTEM PENDING ANALYSIS MECHANICAL NOISE: NC30	PHONE OUTLET DATA OUTLETS WIFI
DOORS/ HARDWARES		**STRUCTURAL**
DOOR TYPE: WOOD DOOR WIDTH (min): 1000mm DOOR HARDWARE: ACOUSTIC SEALS		FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa FLOOR LOADING IMPLICAITIONS (LIVE): 7.2 kPa

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 10.3	**RDS: 078-2**
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS		**SPACE NAME: IT EQUIPMENT STORAGE**
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



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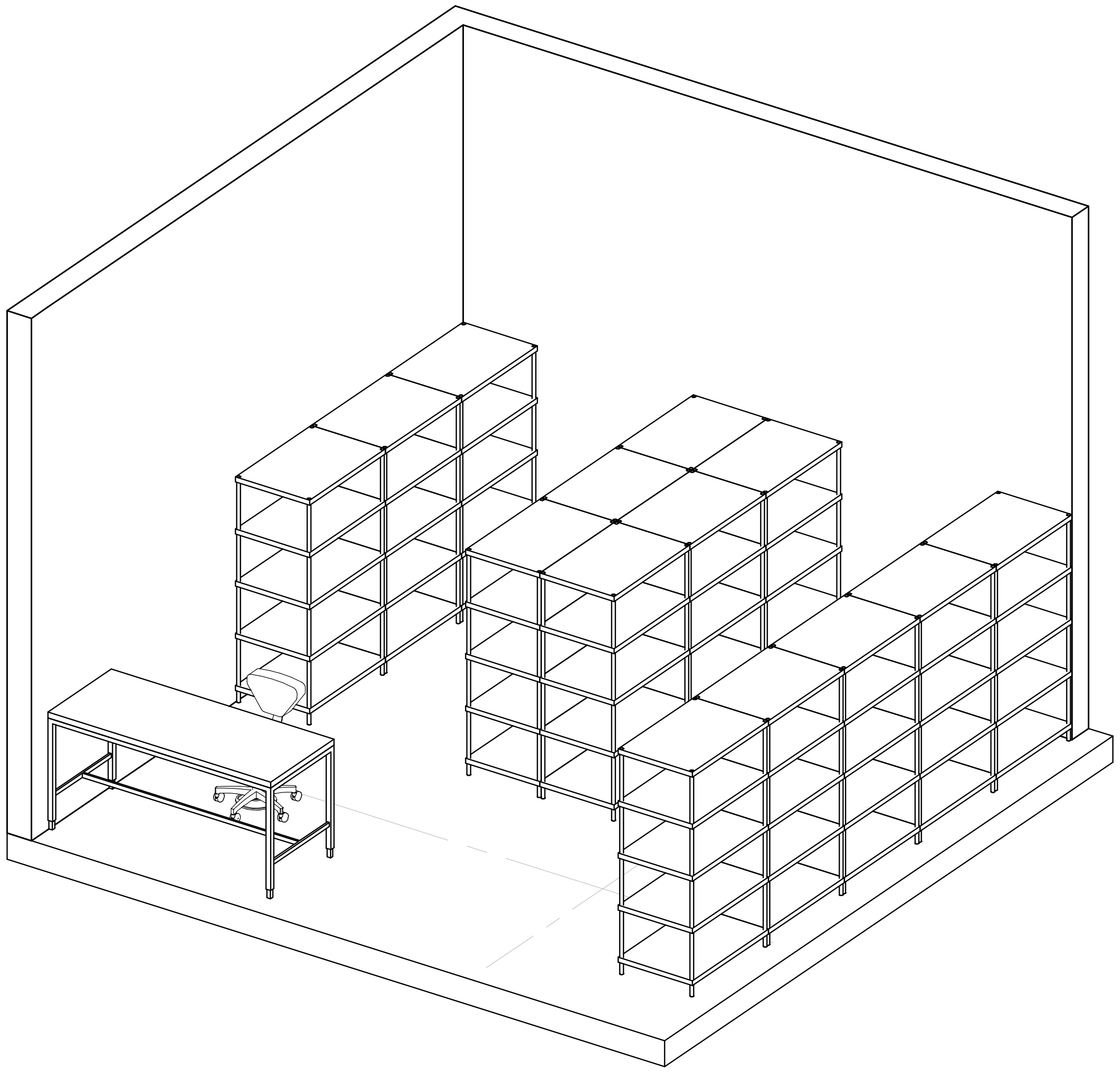
078-2
10.3 - IT EQUIPMENT STORAGE
1 : 50

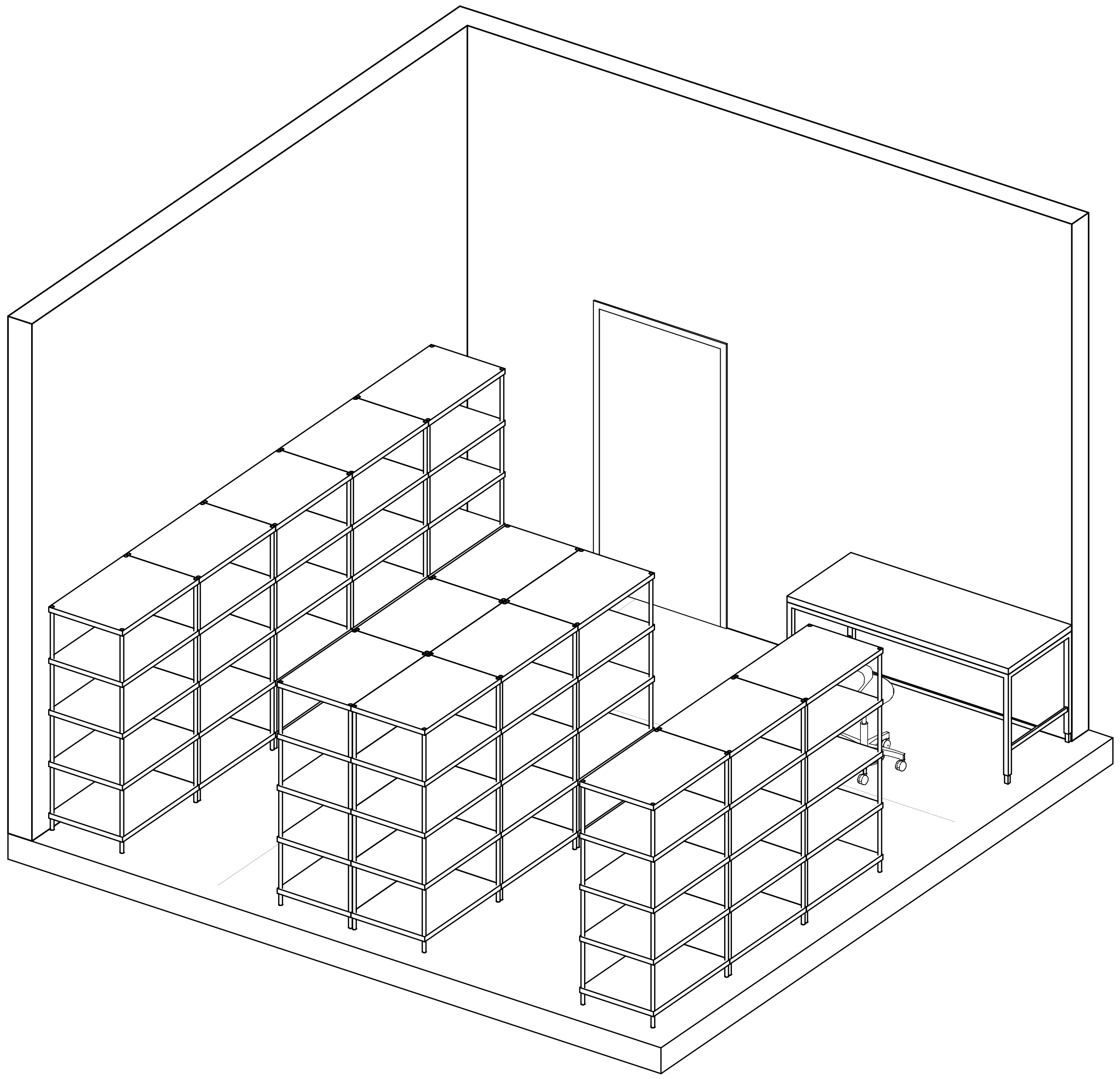
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A61	STORAGE SHELVING, TALL, OPEN 36"		
A64	WORKBENCH, MOBILE		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 10.3		**RDS: 078-3**
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: IT EQUIPMENT STORAGE**
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 6, 20/05/2021	**DEPARTMENTS / GROUP NAME: TSB HO**	**SPACE TYPE: ADMIN SPS**	**NUMBER OF PEOPLE:**	**SPACE ID#: 10.4**	**RDS-079-1**
CHIEF : ___________________________	**ADDITIONAL USER COMMENTS:**			**AREA (m2): 11.90**	**Space Name: MEDIA STORAGE**
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			**OPERATING HOURS: 8AM-5PM**		

ROOM FUNCTION AND ACTIVITES:

COMMUNICATION EQUIPMENT. STORAGE OF DISPLAYS, SIGNAGE, AND OTHER COMMUNICATIONS TOOLS.

ARCHITECTURAL

FLOORING
FLOOR FINISH: CARPET TILE
FLOOR BASE: RUBBER

WALL SYSTEM
GYPSUM BOARD PARTITION (PAINT FINISH)

CEILING
ACOUSTIC TILE (3000 mm AFF)

CASEWORK / MILLWORK

WINDOWS / DAYLIGHTING

DOORS/ HARDWARES
DOOR TYPE: WOOD
DOOR WIDTH (min): 1000mm
DOOR HARDWARE: ACOUSTIC SEALS

SUSTAINABILITY REQUIREMENT

SPECIAL DESIGN CONDITIONS

ACCESSIBILITY REQUIREMENT

PLUMBING

DRAINS AND/OR FIXTURES NOT EXPECTED

MECHANICAL

SETPOINTS 25C +/- 1C SUMMER, 21C +/- 1C WINTER
DEMAND CONTROL VENTILATION
30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER
ROOM TEMPERATURE CONTROL
ZONE HUMIDITY CONTROL
SCHEDULED NIGHT SETBACK
ROOM PRESSURIZATION, NEUTRAL/NOT MONITORED
HEATING/COOLING TERMINAL SYSTEM PENDING ANALYSIS
MECHANICAL NOISE: NC30

FIRE PROTECTION / ALARM

WET PIPE SPRINKLER SYSTEM
VISUAL/AUDIBLE ALARM SIGNALS TO NBCC

ELECTRICAL / POWER

NORMAL POWER RECEPTACLES
EMERGENCY POWER RECEPTACLES

LIGHTING

SUSPENDED LIGHTING
OCCUPANCY/VACANCY SENSOR
3500K

SECURITY

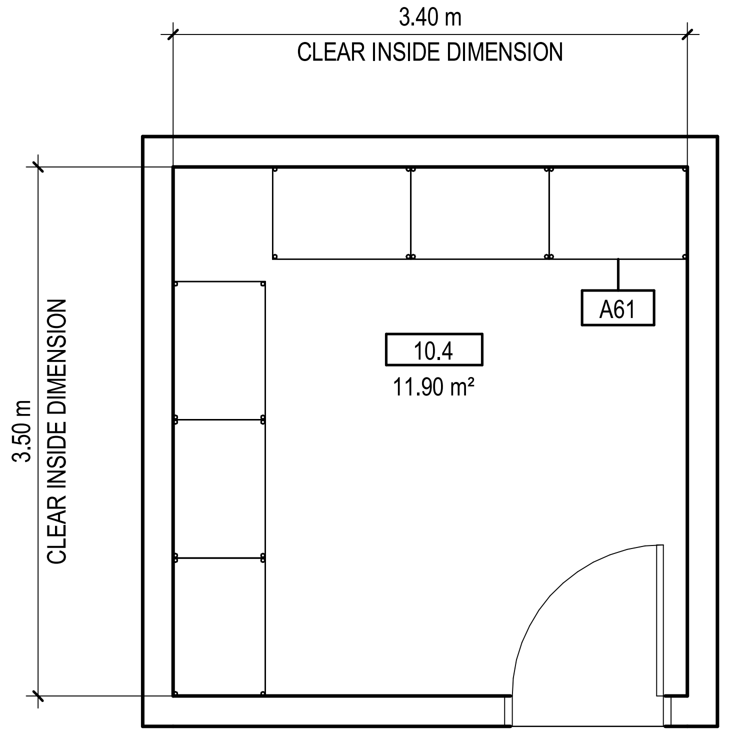
Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

COMMUNICATIONS

STRUCTURAL

FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICAITIONS (LIVE): 7.2 kPa

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 10.4		RDS: 079-2
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS			SPACE NAME: MEDIA STORAGE
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			



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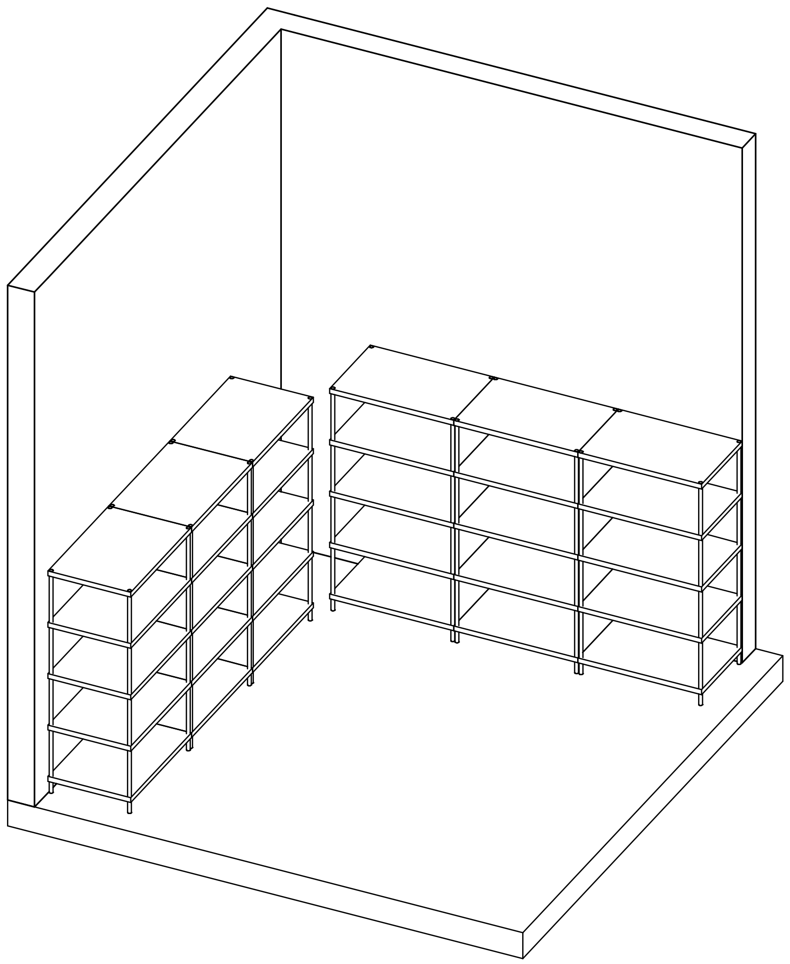
079-2
10.4 - MEDIA STORAGE
1 : 50

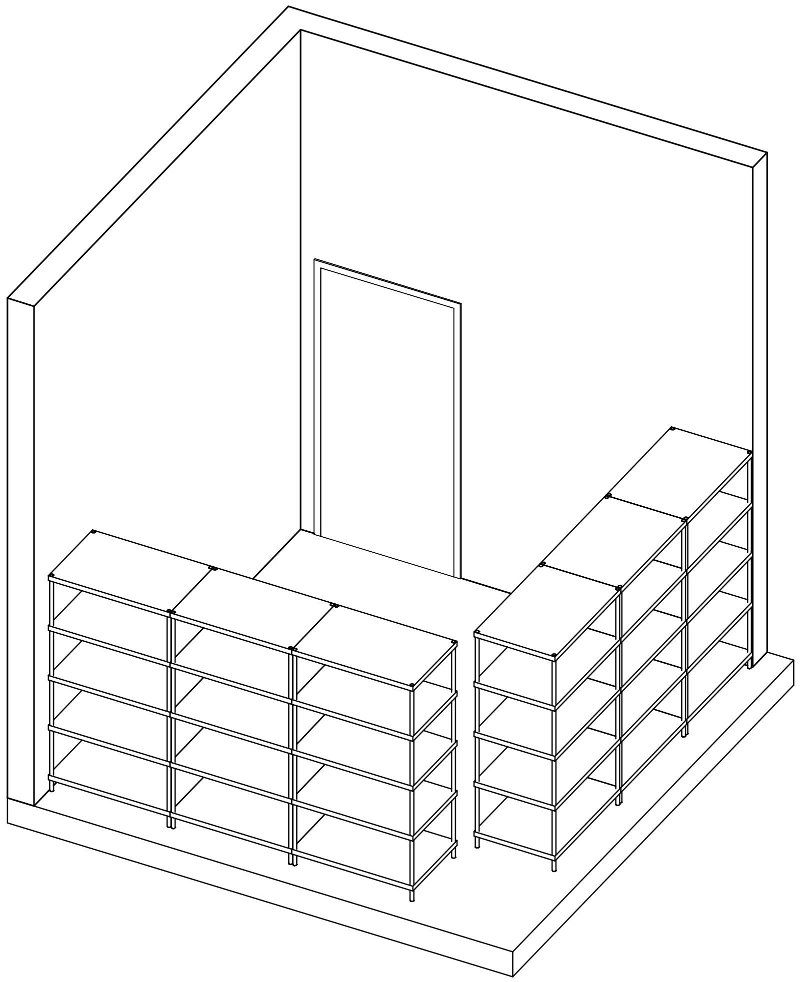
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A61	STORAGE SHELVING, TALL, OPEN 36"		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 10.4		**RDS: 079-3**
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN/SHARED SUPPORT			**SPACE NAME: MEDIA STORAGE**
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 6, 20/05/2021	**DEPARTMENTS / GROUP NAME: TSB HO**	**SPACE TYPE: ADMIN SPS**	**NUMBER OF PEOPLE:**	**SPACE ID#: 10.5**	**RDS-080-1**
CHIEF : ___________________________	**ADDITIONAL USER COMMENTS:**			**AREA (m2): 19.36**	**Space Name: ADMINISTRATIVE EQUIPMENT STORAGE**
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			**OPERATING HOURS: 8AM-5PM**		

ROOM FUNCTION AND ACTIVITES:

ADMINISTRATIVE EQUIPMENT ROOM C/W MOBILE SHELVING. STORAGE OF OFFICE SUPPLIES, STATIONARY, INK/TONER, SOME CONTROLLED EQUIPMENT (CELL PHONES), SOME LOCKABLE CABINETS/STORAGE REQUIRED.

ARCHITECTURAL

FLOORING
FLOOR FINISH: CARPET TILE
FLOOR BASE: RUBBER

WALL SYSTEM
GYPSUM BOARD PARTITION (PAINT FINISH)
ACOUSTIC LEVEL: SPEECH SECURE

CEILING
ACOUSTIC TILE (3000 mm AFF)

CASEWORK / MILLWORK

WINDOWS / DAYLIGHTING

DOORS/ HARDWARES
DOOR TYPE: WOOD
DOOR WIDTH (min): 1000mm
DOOR HARDWARE: ACOUSTIC SEALS

SUSTAINABILITY REQUIREMENT

SPECIAL DESIGN CONDITIONS

ACCESSIBILITY REQUIREMENT

PLUMBING

DRAINS AND/OR FIXTURES NOT EXPECTED

MECHANICAL

SETPOINTS 25C +/- 1C SUMMER, 21C +/- 1C WINTER
DEMAND CONTROL VENTILATION
30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER
ROOM TEMPERATURE CONTROL
ZONE HUMIDITY CONTROL
SCHEDULED NIGHT SETBACK
ROOM PRESSURIZATION, NEUTRAL/NOT MONITORED
HEATING/COOLING TERMINAL SYSTEM PENDING ANALYSIS
MECHANICAL NOISE: NC30

FIRE PROTECTION / ALARM

WET PIPE SPRINKLER SYSTEM
VISUAL/AUDIBLE ALARM SIGNALS TO NBCC

ELECTRICAL / POWER

NORMAL POWER RECEPTACLES

LIGHTING

RECESSED LIGHTING
OCCUPANCY/VACANCY SENSOR
3500K

SECURITY

Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

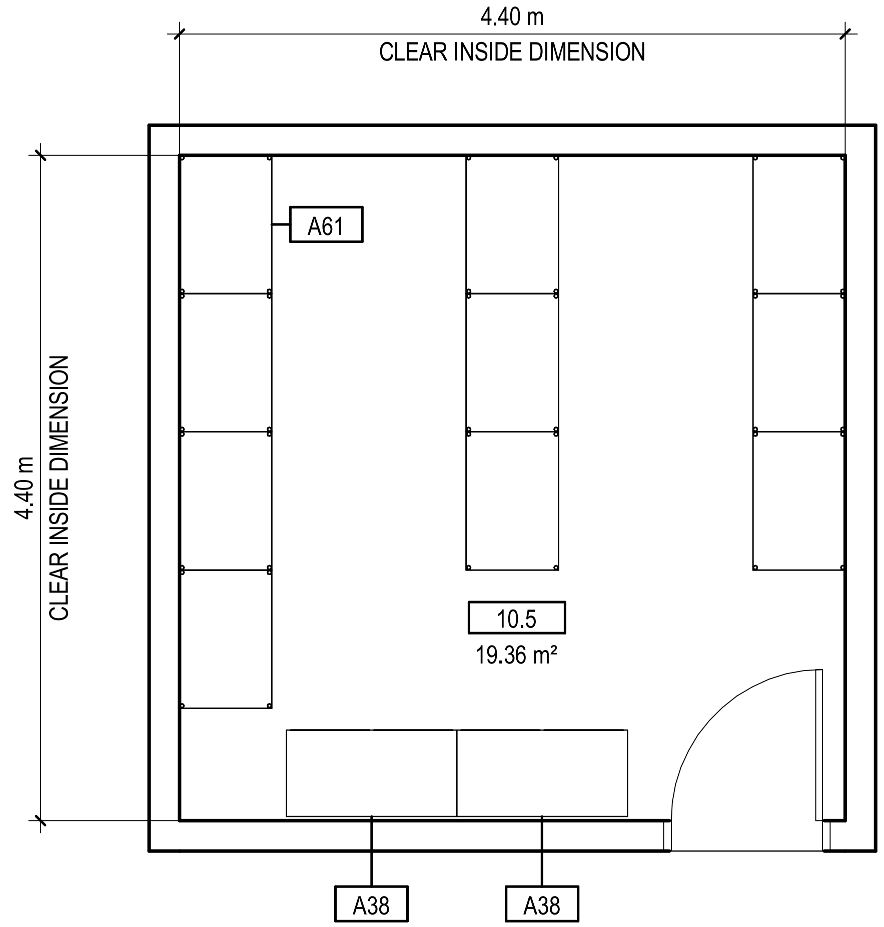
COMMUNICATIONS

PHONE OUTLET
DATA OUTLET
WIFI

STRUCTURAL

FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICAITIONS (LIVE): 7.2 kPa

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 10.5	RDS: 080-2
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS		SPACE NAME: ADMINISTRATIVE EQUIPMENT STORAGE
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



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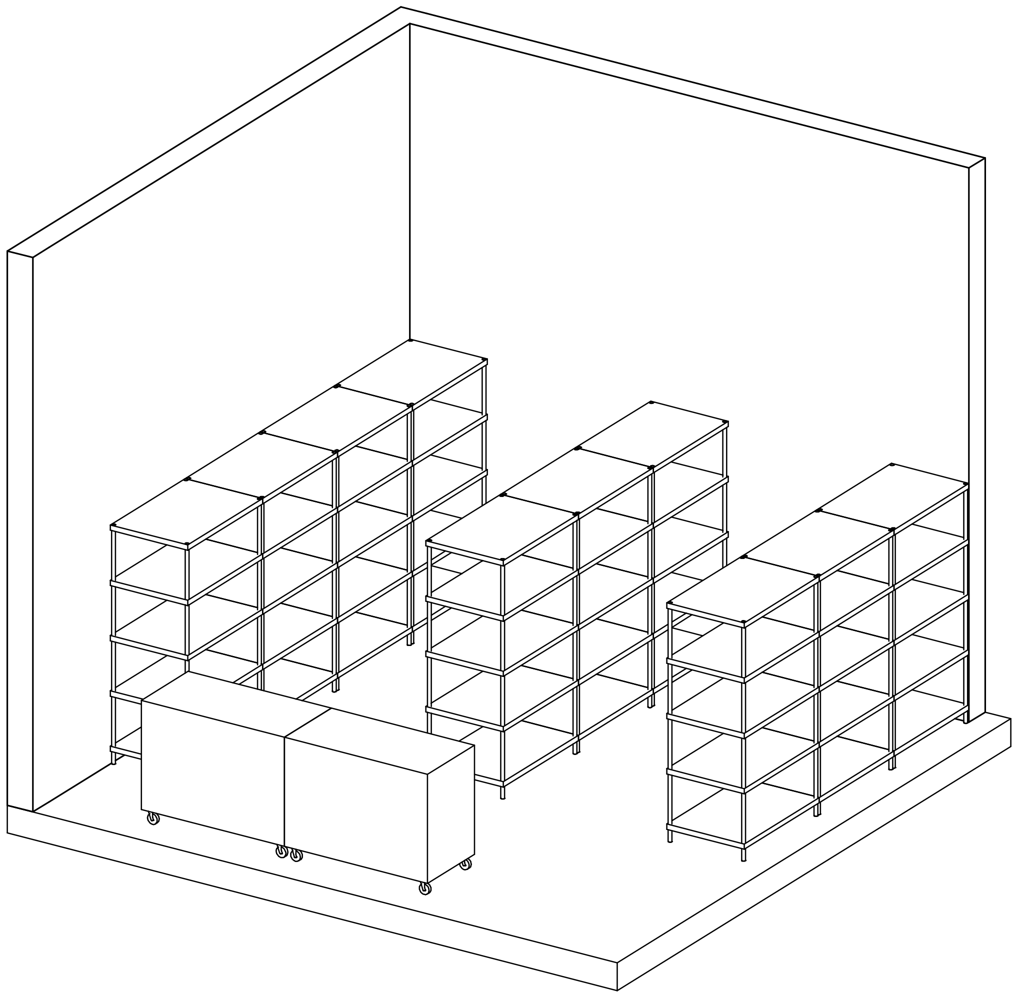
080-2
10.5 - ADMINISTRATIVE EQUIPMENT STORAGE
1 : 50

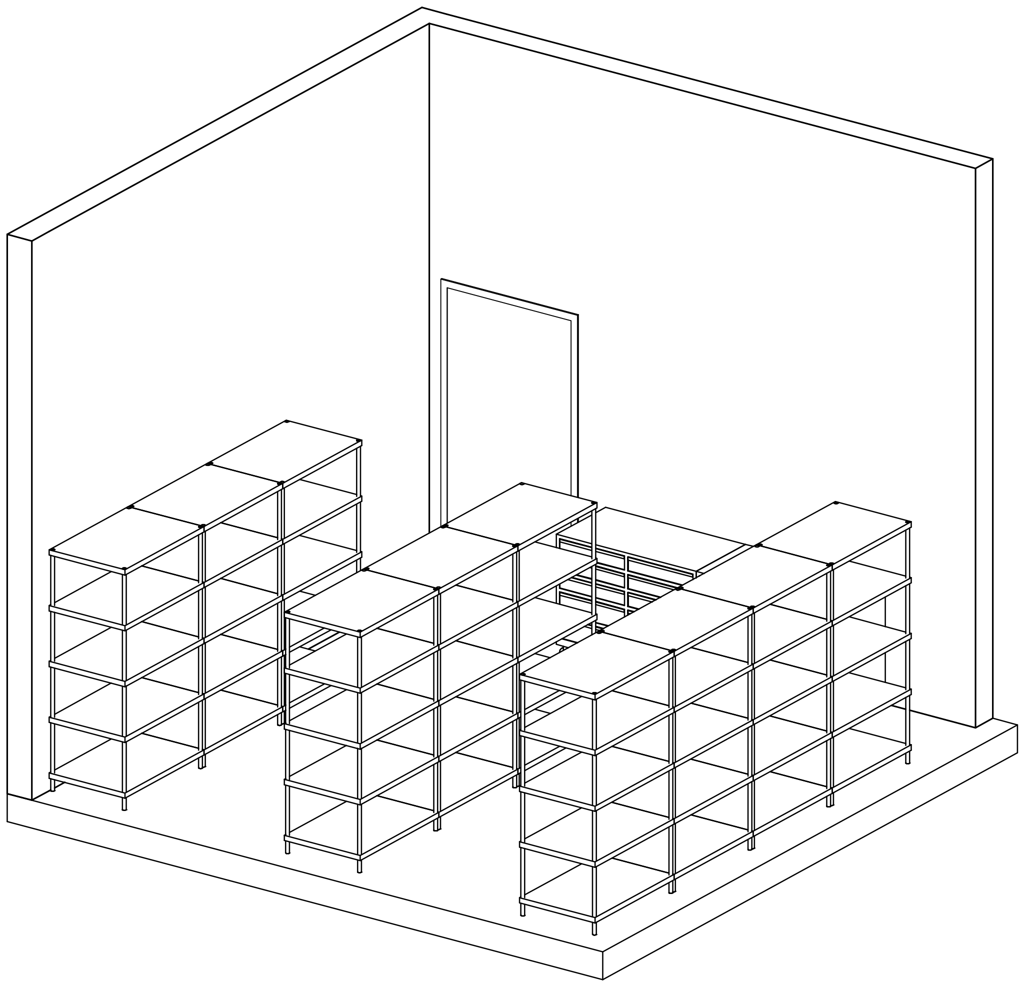
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A38	MOBILE STORAGE CABINET, DRAWERS		
A61	STORAGE SHELVING, TALL, OPEN 36"		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 10.5		RDS: 080-3
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS	LAB CERTIFICATION REQUIREMENTS:		SPACE NAME: ADMINISTRATIVE EQUIPMENT STORAGE
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 6, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS	NUMBER OF PEOPLE:	SPACE ID#: 10.8	RDS-082-1
CHIEF : ______________________________	ADDITIONAL USER COMMENTS:			AREA (m2): 35.38	Space Name: TELECOM AND SERVER ROOM
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			OPERATING HOURS: 8AM-5PM		

ROOM FUNCTION AND ACTIVITES:

TELECOM AND SERVER EQUIPMENT, TSB HO CONNECTIVITY HUB

ARCHITECTURAL	SUSTAINABILITY REQUIREMENT	FIRE PROTECTION / ALARM
FLOORING FLOOR FINISH: ANTISTATIC TILE FLOOR BASE: ANTISTATIC TILE		DOUBLE INTERLOCK PRE-ACTION DRY-PIPE SPRINKLER SYSTEM VISUAL/AUDIBLE ALARM SIGNALS TO NBCC
WALL SYSTEM	**SPECIAL DESIGN CONDITIONS**	**ELECTRICAL / POWER**
GYPSUM BOARD PARTITION (PAINT FINSH) ACOUSTIC LEVEL: SPEECH SECURE		NORMAL POWER RECEPTACLES EMERGENCY POWER RECEPTACLES UPS POWER RECEPTACLES
CEILING	**ACCESSIBILITY REQUIREMENT**	**LIGHTING**
ACOUSTIC TILE (3000 mm AFF)		SUSPENDED LIGHTING OCCUPANCY/VACANCY SENSOR
CASEWORK / MILLWORK	**PLUMBING**	**SECURITY**
WORKBENCHES COMPLETE WITH ELECTRICAL COMMS. OUTLET TO ALLOW PREPARING/TESTING IT EQUIPMENT	DRAINS AND/OR FIXTURES NOT EXPECTED	Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team. ALTHOUGH NOT A SECURITY ZONE, ROOM TO HAVE RESTRICTED ACCESS CONTROL VIA SWIPECARD
WINDOWS / DAYLIGHTING	**MECHANICAL**	**COMMUNICATIONS**
NATURAL DAYLIGHTING NOT REQUIRED	SETPOINTS 25C +/- 1C SUMMER, 21C +/- 1C WINTER DEMAND CONTROL VENTILATION 30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER ROOM TEMPERATURE CONTROL ZONE HUMIDITY CONTROL SCHEDULED NIGHT SETBACK ROOM PRESSURIZATION, NEUTRAL/NOT MONITORED DEDICATED AIR CONDITIONING SYSTEM (TBC) MECHANICAL NOISE: NC30	CABLE TRAY PHONE OUTLET DATA OUTLET WIFI
DOORS/ HARDWARES		**STRUCTURAL**
DOOR TYPE: WOOD DOOR WIDTH (min): 1000mm DOOR HARDWARE: ACOUSTIC SEALS		FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa FLOOR LOADING IMPLICAITIONS (LIVE): 4.8 kPa

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 10.7	**RDS: 082-2**
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS		**SPACE NAME: TELECOM AND SERVER ROOM**
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		

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082-2

10.7 - TELECOM AND SERVER ROOM

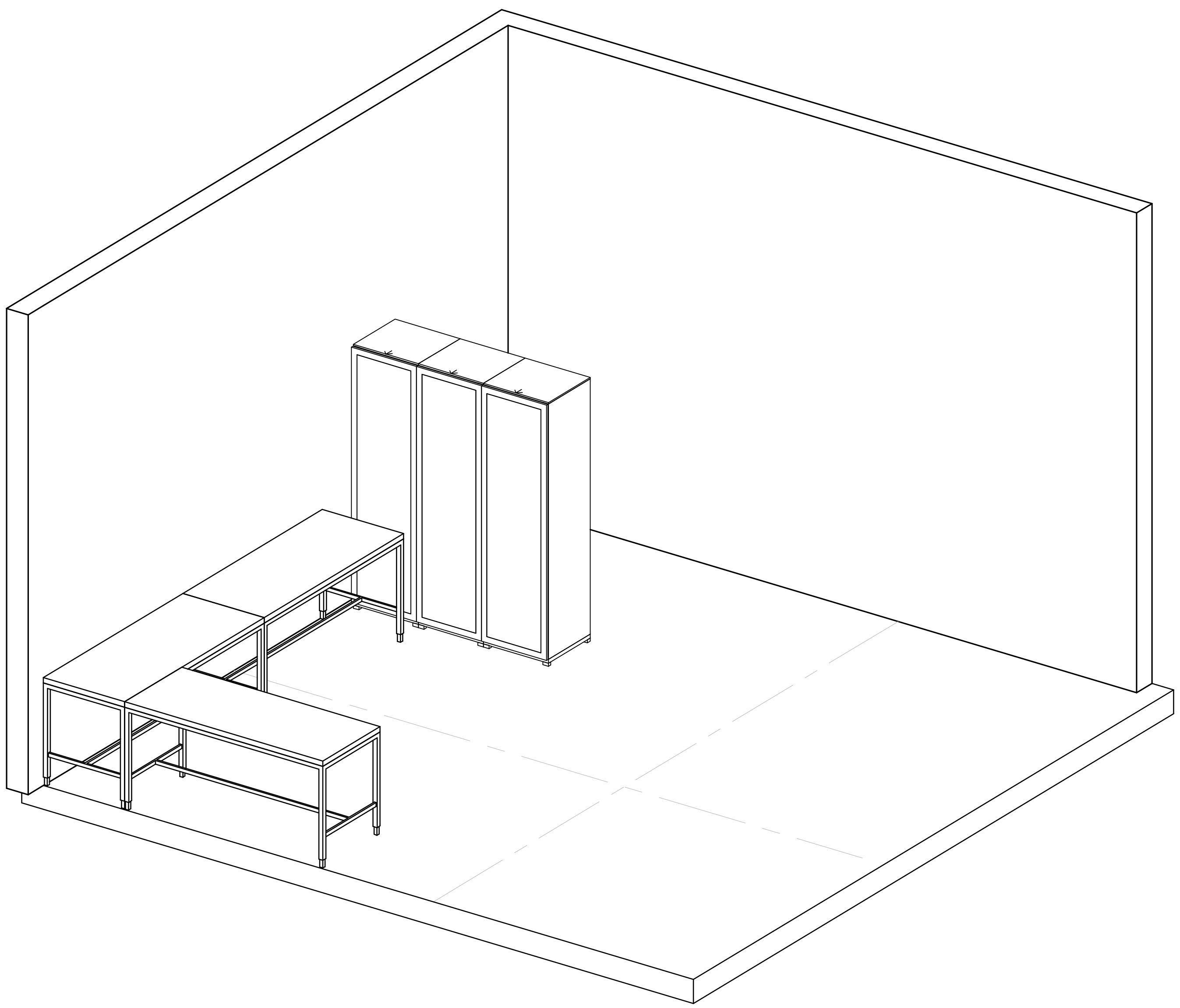
1 : 50

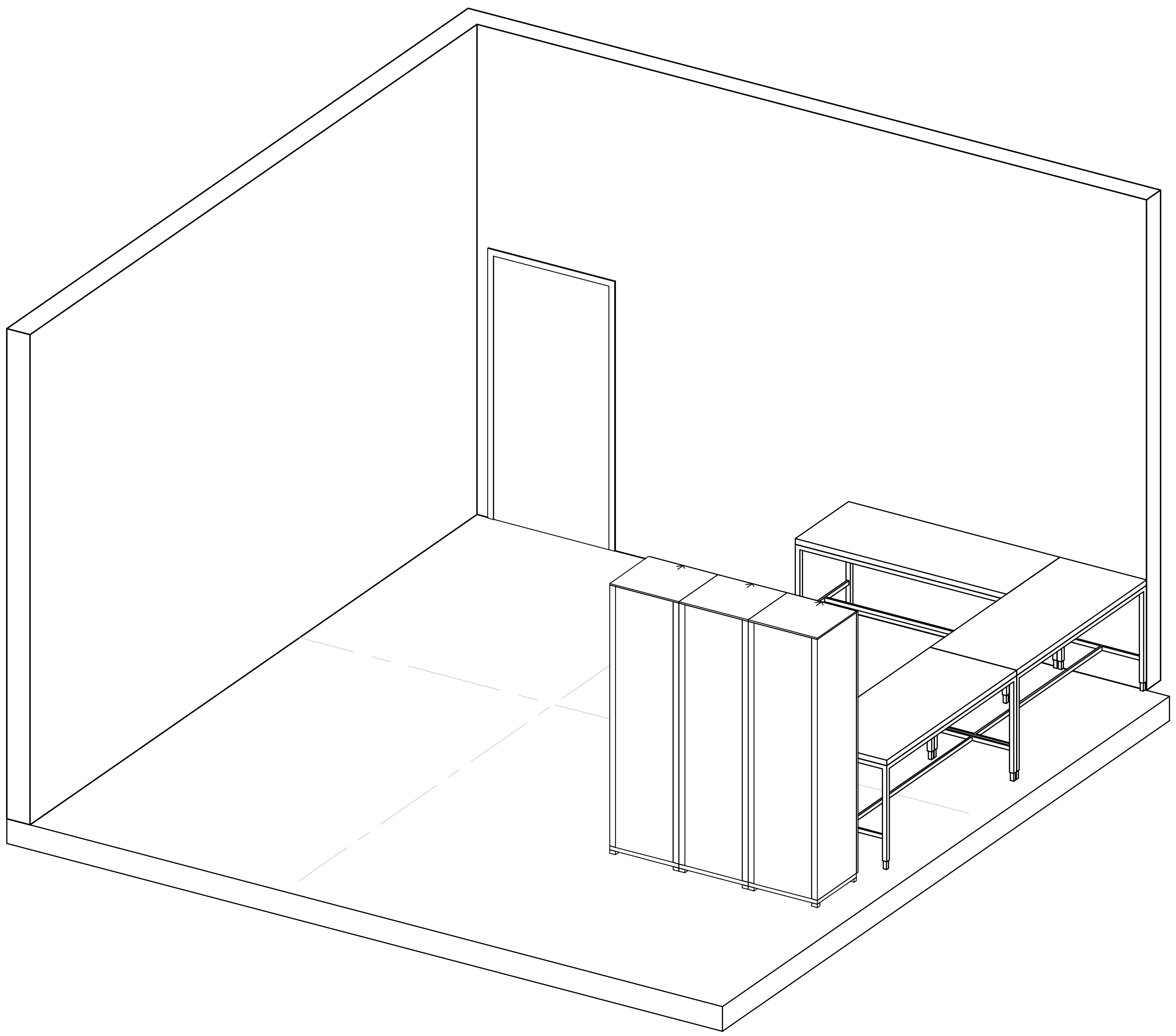
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A64	WORKBENCH, MOBILE		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 6, 20/05/2021		SPACE ID #: 10.7		RDS: 082-3
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS			SPACE NAME: TELECOM AND SERVER ROOM
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 5, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS	NUMBER OF PEOPLE:	SPACE ID#: 10.9	RDS-084-1
CHIEF : ________________________________	ADDITIONAL USER COMMENTS:			AREA (m2): 12	Space Name: TRAINING EQUIPMENT STORAGE
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			OPERATING HOURS: 8AM-5PM		

ROOM FUNCTION AND ACTIVITES:

TRAINING EQUIPMENT STORAGE. ADMINISTRATIVE EQUIPMENT ROOM C/W MOBILE STORAGE. REQUIRES AMPLE SHELVING AND A LARGE CLOSED STORAGE UNIT.

ARCHITECTURAL

FLOORING

FLOOR FINISH: SHEET VINYL FLOORING
FLOOR BASE: RUBBER

WALL SYSTEM

GYPSUM BOARD PARTITION (PAINT FINISH)
ACOUSTIC LEVEL: SPEECH SECURE

CEILING

ACOUSTIC TILE (3000 mm AFF)

CASEWORK / MILLWORK

WINDOWS / DAYLIGHTING

DOORS/ HARDWARES

DOOR TYPE: WOOD
DOOR WIDTH (min): 1400mm (2 x 700mm)
DOOR HARDWARE: ACOUSTIC SEALS

SUSTAINABILITY REQUIREMENT

SPECIAL DESIGN CONDITIONS

ACCESSIBILITY REQUIREMENT

PLUMBING

DRAINS AND/OR FIXTURES NOT EXPECTED

MECHANICAL

SETPOINTS 25C +/- 1C SUMMER, 21C +/- 1C WINTER
DEMAND CONTROL VENTILATION
30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER
ROOM TEMPERATURE CONTROL
ZONE HUMIDITY CONTROL
SCHEDULED NIGHT SETBACK
ROOM PRESSURIZATION, NEUTRAL/NOT MONITORED
HEATING/COOLING TERMINAL SYSTEM PENDING ANALYSIS
MECHANICAL NOISE: NC30

FIRE PROTECTION / ALARM

WET PIPE SPRINKLER SYSTEM
VISUAL/AUDIBLE ALARM SIGNALS TO NBCC

ELECTRICAL / POWER

NORMAL POWER RECEPTACLES

LIGHTING

RECESSED LIGHTING
OCCUPANCY/VACANCY SENSOR
3500K

SECURITY

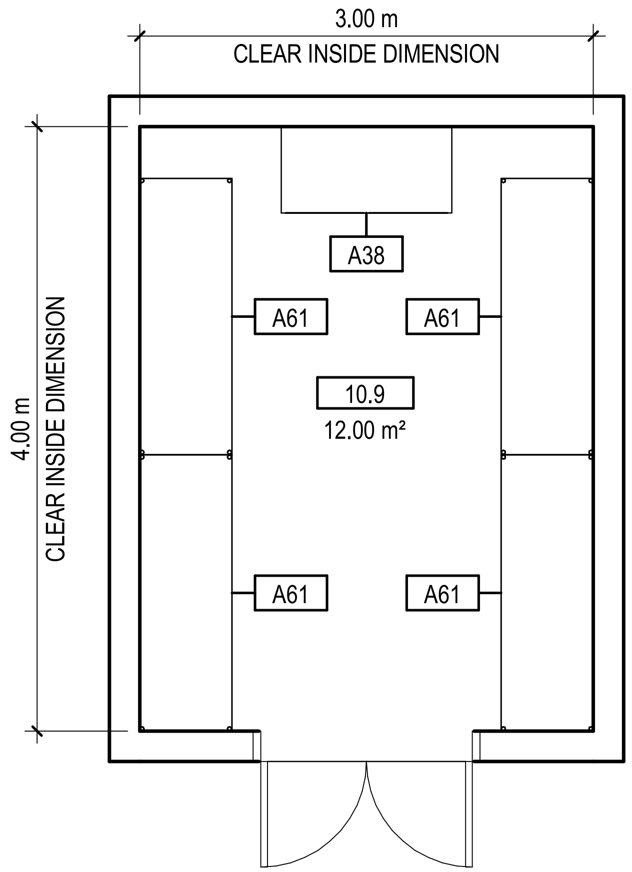
Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

COMMUNICATIONS

STRUCTURAL

FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICAITIONS (LIVE): 7.2 kPa

REVISION # & ISSUE DATE: REV 5, 20/05/2021		SPACE ID #: 10.9		**RDS: 084-2**
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS	LAB CERTIFICATION REQUIREMENTS:		**SPACE NAME: TRAINING EQUIPMENT STORAGE**
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM			
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: LARGE MEETING ROOM	SECONDARY ADJACENCY	TERTIARY ADJACENCY	



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084-2

10.9 - TRAINING EQUIPMENT STORAGE

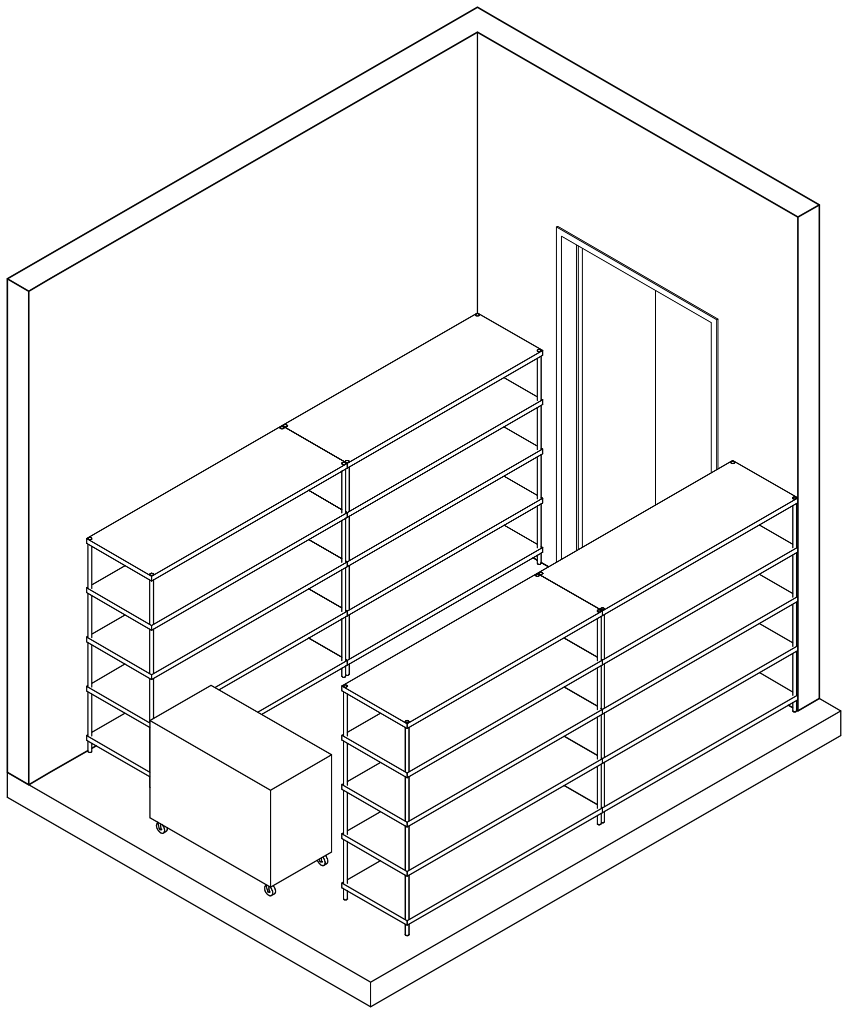
1 : 50

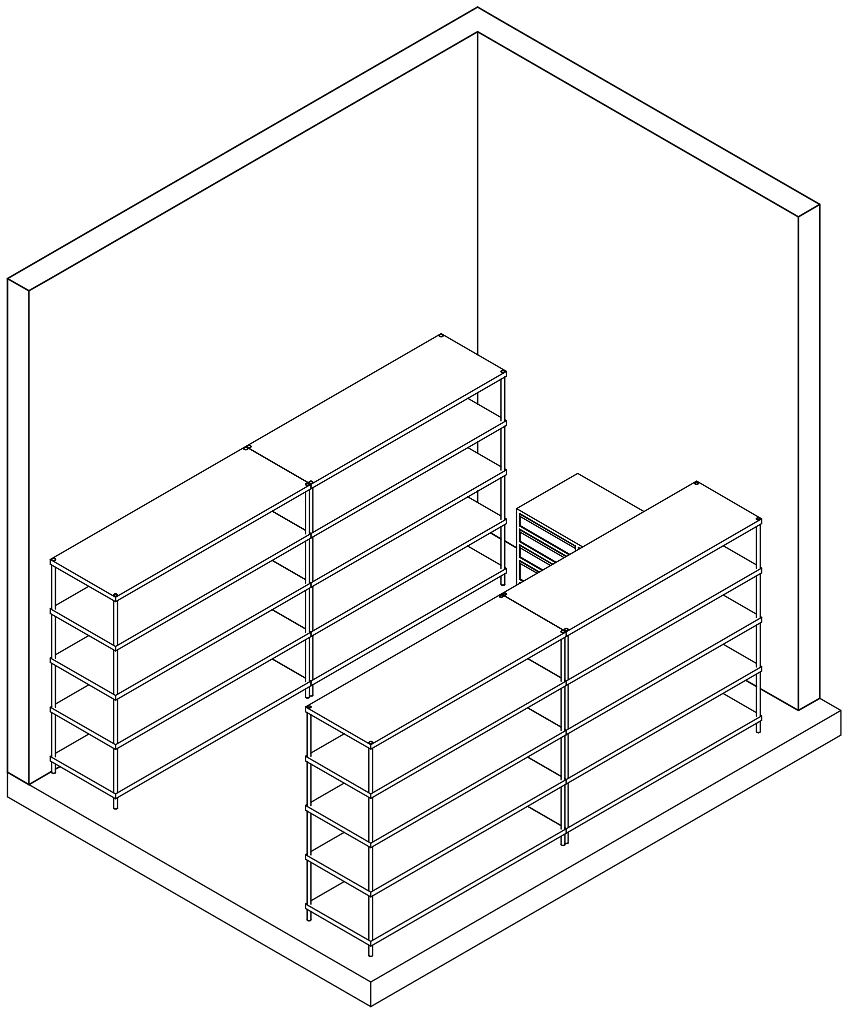
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A65B	LOCKERS, OVERSIZED		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 5, 20/05/2021		SPACE ID #: 10.9		RDS: 084-3
DEPARTMENTS / GROUP NAME: TSB HO	SPACE TYPE: ADMIN SPS			SPACE NAME: TRAINING EQUIPMENT STORAGE
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS:	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY: LARGE MEETING ROOM — SECONDARY ADJACENCY — TERTIARY ADJACENCY			





REVISION # & ISSUE DATE: REV 5, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB HO + TSTS	SPACE TYPE: PUBLIC SPACE	NUMBER OF PEOPLE: 10	SPACE ID#: 11.1	**RDS-089-1**
CHIEF : ________________	ADDITIONAL USER COMMENTS:			AREA (m2): 32.40	**Space Name: SECURITY AREA**
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			OPERATING HOURS: 8AM-5PM		

ROOM FUNCTION AND ACTIVITES:

SECURITY AREA COMPLETE WITH SECURITY DESK, SECURITY ROOM, INTERVIEW ROOM, METAL DETECTOR, SCANNERS, AND LOBBY.

ARCHITECTURAL

FLOORING

FLOOR FINISH: CARPET TILE
FLOOR BASE: RUBBER

WALL SYSTEM

GYPSUM BOARD PARTITION (PAINT FINISH)

CEILING

ACOUSTIC TILE (3000 mm AFF)

CASEWORK / MILLWORK

WINDOWS / DAYLIGHTING

N/A

DOORS/ HARDWARES

DOOR TYPE: WOOD
DOOR WIDTH (min): 1000mm
DOOR HARDWARE: ACOUSTIC SEALS

SUSTAINABILITY REQUIREMENT

SPECIAL DESIGN CONDITIONS

ACCESSIBILITY REQUIREMENT

PLUMBING

DRAINS AND/OR FIXTURES NOT EXPECTED

MECHANICAL

SETPOINTS 25C +/- 1C SUMMER, 21C +/- 1C WINTER
DEMAND CONTROL VENTILATION
30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER
ROOM TEMPERATURE CONTROL
ZONE HUMIDITY CONTROL
SCHEDULED NIGHT SETBACK
ROOM PRESSURIZATION, NEUTRAL/NOT MONITORED
HEATING/COOLING TERMINAL SYSTEM PENDING ANALYSIS
MECHANICAL NOISE: NC30

FIRE PROTECTION / ALARM

WET PIPE SPRINKLER SYSTEM
VISUAL/AUDIBLE ALARM SIGNALS TO NBCC

ELECTRICAL / POWER

NORMAL POWER RECEPTACLES

LIGHTING

RECESSED LIGHTING
OCCUPANCY/VACANCY SENSOR
3500K

SECURITY

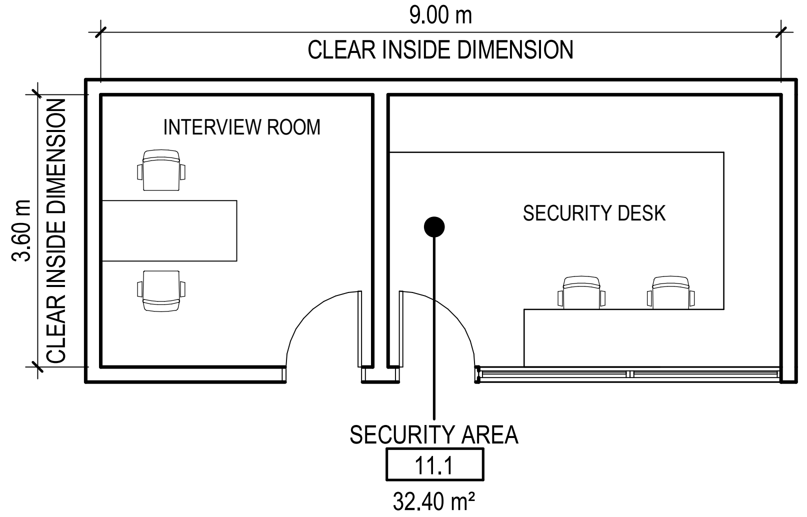
Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.

COMMUNICATIONS

STRUCTURAL

FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa
FLOOR LOADING IMPLICAITIONS (LIVE): 7.2 kPa

REVISION # & ISSUE DATE: REV 5, 20/05/2021		SPACE ID #: 11.1	**RDS: 089-2**
DEPARTMENTS / GROUP NAME: TSB HO + TSTS HUB	SPACE TYPE: PUBLIC SPACE		**SPACE NAME: SECURITY AREA**
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY - - SECONDARY ADJACENCY - - TERTIARY ADJACENCY		



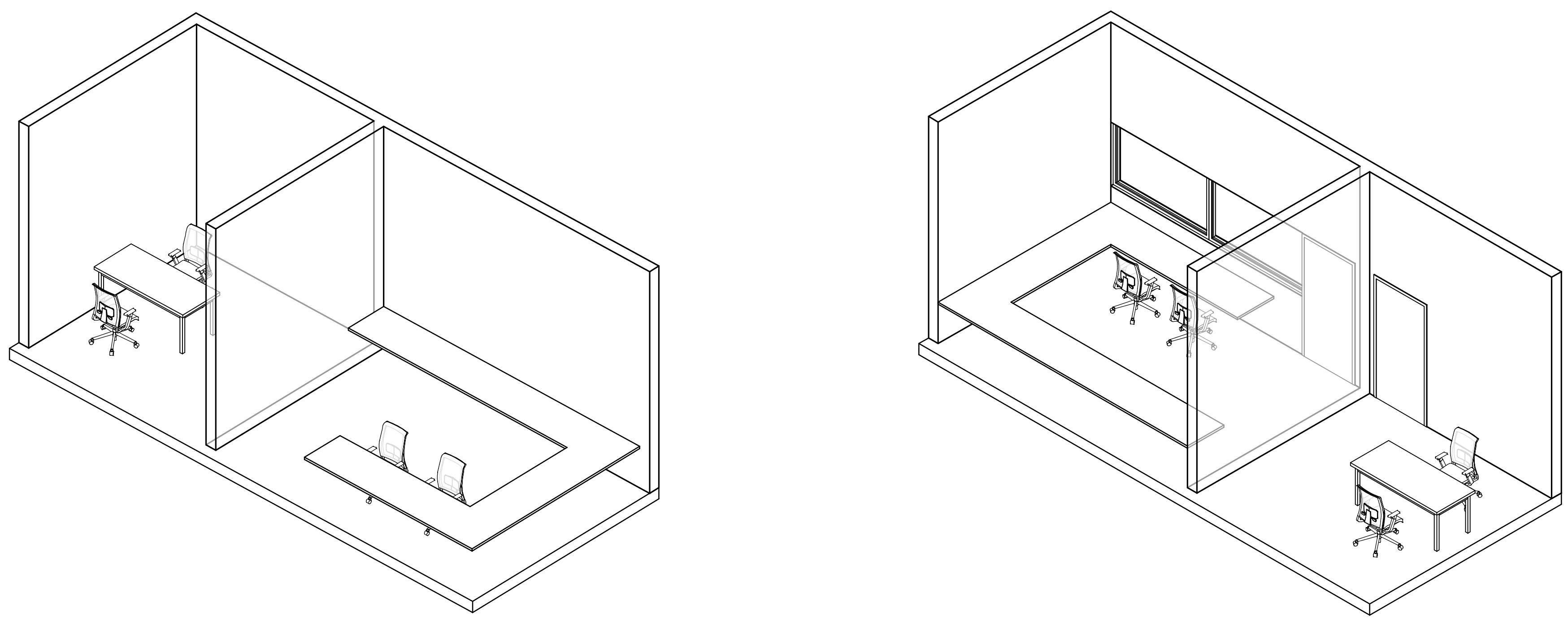
1 089-2 **SECURITY AREA**
1 : 100

LEGEND

ARCHITECTURAL SYSTEMS	UTILITIES / SYSTEMS

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 5, 20/05/2021		SPACE ID #: 11.1	**RDS: 089-3**
DEPARTMENTS / GROUP NAME: TSB HO + TSTS HUB	SPACE TYPE: PUBLIC SPACE		**SPACE NAME: SECURITY AREA**
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



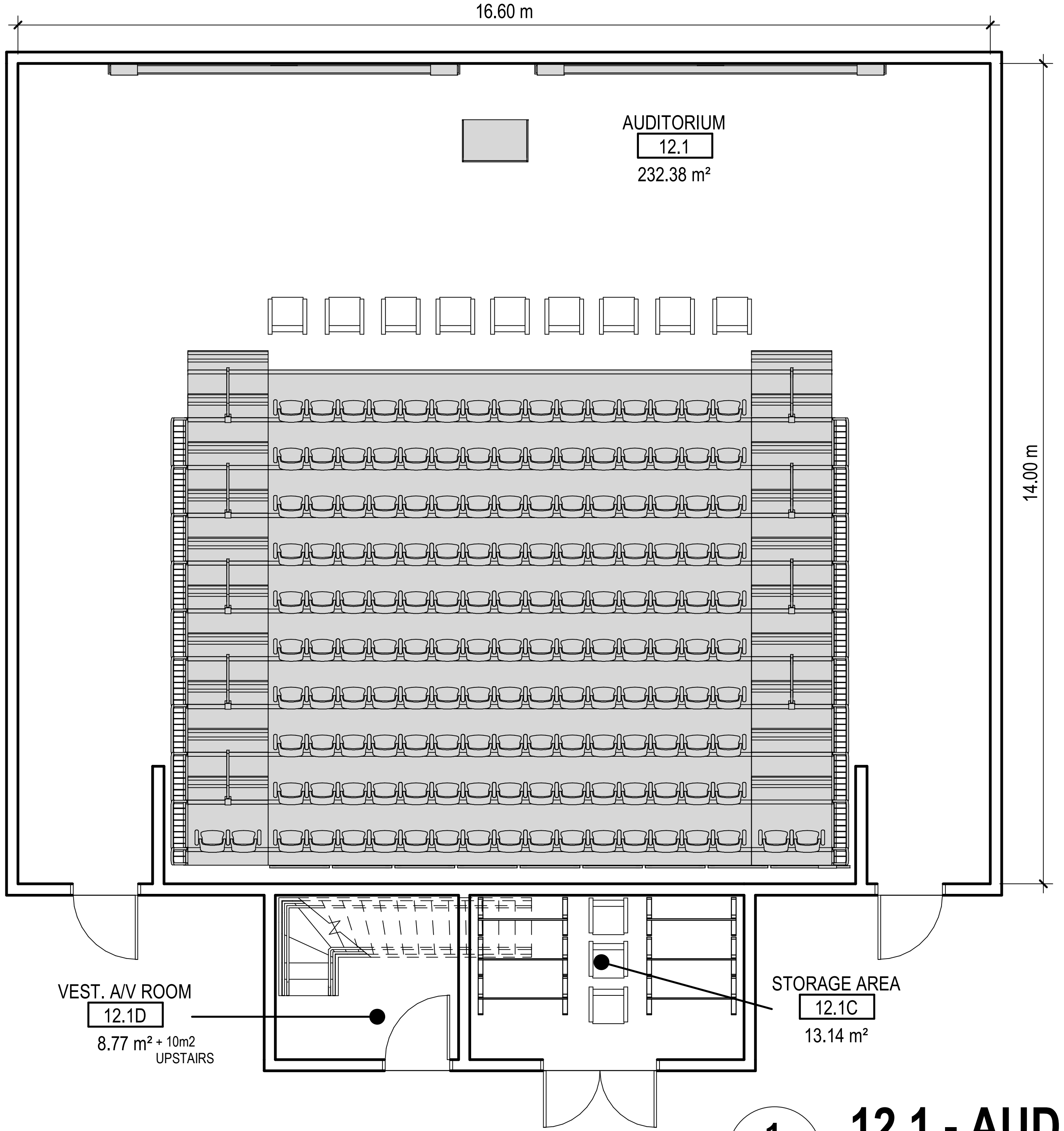
REVISION # & ISSUE DATE: REV 4, 20/05/2021	**DEPARTMENTS / GROUP NAME: TSTS HUB**	**SPACE TYPE: ADMIN SPS**	**NUMBER OF PEOPLE: 154 FIXED + 9 NON FIXED SEATING**	**SPACE ID#: 12.1**	**RDS-090-1**
CHIEF : ____________________	**ADDITIONAL USER COMMENTS:**			**AREA (m2): 232.38**	**Space Name: AUDITORIUM**
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			**OPERATING HOURS: 8AM-5PM**		

ROOM FUNCTION AND ACTIVITES:

AUDITORIUM COMPLETE WITH TELESCOPING SEATING AND MEETING ROOM ADJACENT.

ARCHITECTURAL	SUSTAINABILITY REQUIREMENT	FIRE PROTECTION / ALARM
FLOORING FLOOR FINISH: SHEET VINYL FLOORING FLOOR BASE: RUBBER		WET PIPE SPRINKLER SYSTEM VISUAL/AUDIBLE ALARM SIGNALS TO NBCC
WALL SYSTEM	**SPECIAL DESIGN CONDITIONS**	**ELECTRICAL / POWER**
GYPSUM BOARD PARTITION (PAINT FINISH) ACOUSTIC LEVEL: SPEECH SECURE ACOUSTIC WOOD SLAT WALL PANELS AT REAR AND SIDE - 50%	RETRACTABLE PROJECTION SCREENS / LARGE VIDEO MONITORS	NORMAL POWER RECEPTACLES
CEILING	**ACCESSIBILITY REQUIREMENT**	**LIGHTING**
AUDITORIUM - ACOUSTIC TILE (6000 mm AFF) TRAINING ROOMS - ACOUSTIC TILE (4500 AFF) ACOUSTIC PERFORATED WOOD CEILING PANELS - 50%	ACCESSIBLE SEATING AT FRONT OF AUDITORIUM SEATING	RECESSED LIGHTING OCCUPANCY/VACANCY SENSOR 3500K
CASEWORK / MILLWORK	**PLUMBING**	**SECURITY**
	DRAINS AND/OR FIXTURES NOT EXPECTED	Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.
WINDOWS / DAYLIGHTING	**MECHANICAL**	**COMMUNICATIONS**
GLAZING W/ OPERABLE WINDOW SHADES	SETPOINTS 25C +/- 1C SUMMER, 21C +/- 1C WINTER DEMAND CONTROL VENTILATION 30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER ROOM TEMPERATURE CONTROL ZONE HUMIDITY CONTROL SCHEDULED NIGHT SETBACK ROOM PRESSURIZATION, NEUTRAL/NOT MONITORED HEATING/COOLING TERMINAL SYSTEM PENDING ANALYSIS MECHANICAL NOISE: NC30	PHONE OUTLET DATA OUTLET WIFI
DOORS/ HARDWARES		**STRUCTURAL**
DOOR TYPE: WOOD DOOR WIDTH (min): 1000mm DOOR HARDWARE: ACOUSTIC SEALS		FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa FLOOR LOADING IMPLICAITIONS (LIVE): 7.2 kPa

REVISION # & ISSUE DATE: REV 4, 20/05/2021		SPACE ID #: 12.1	RDS: 090-2
DEPARTMENTS / GROUP NAME: TSTS HUB	SPACE TYPE: SHARED SPACE		SPACE NAME: AUDITORIUM
CONTAINMENT RISK LEVEL: N/A	OPERATING HOURS:	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



12.1 - AUDITORIUM

1 : 100

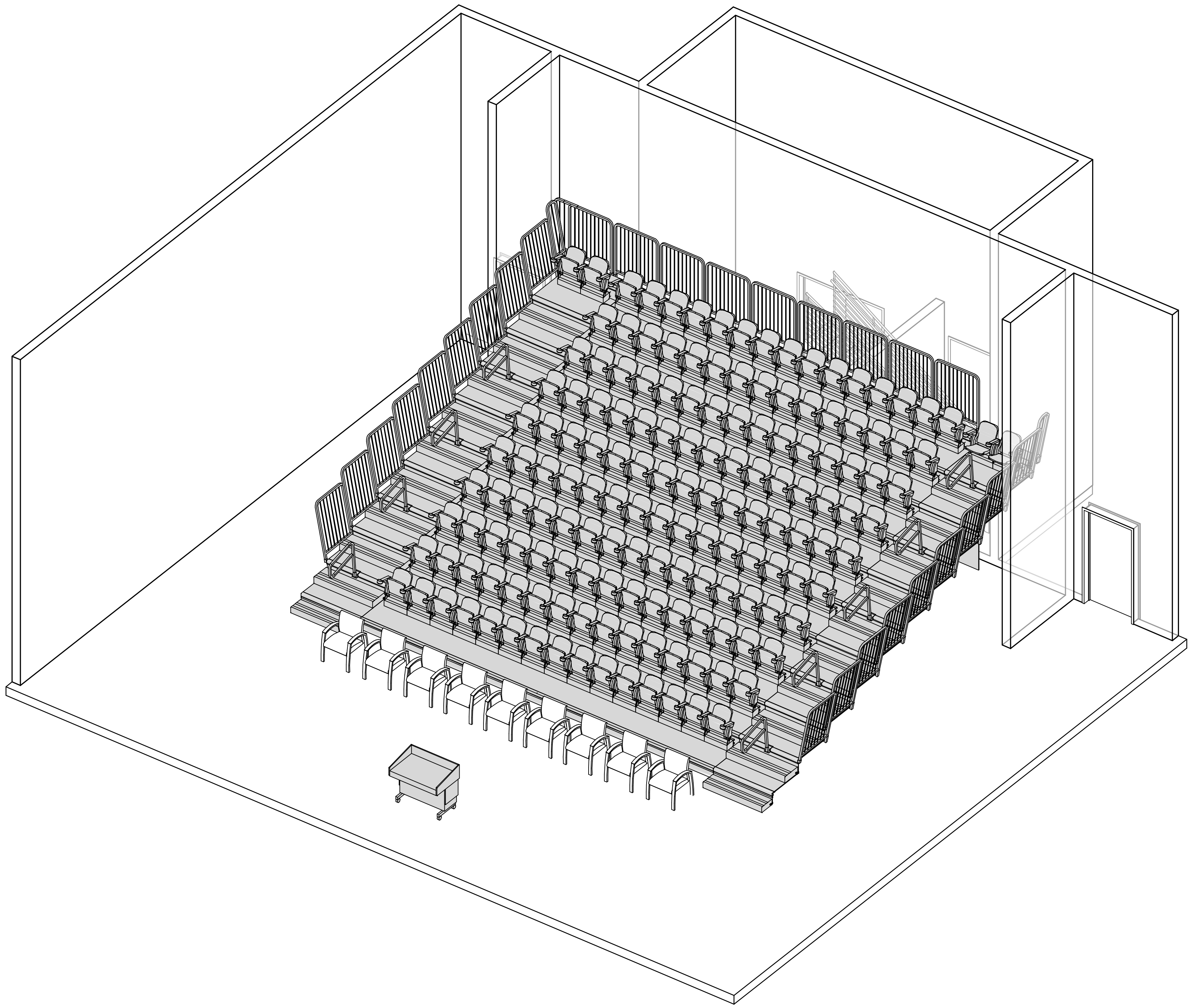
LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	

SPECIALTY EQUIPMENT

E8A	PROJECTION SCREEN		

REVISION # & ISSUE DATE:	REV 4, 20/05/2021		SPACE ID #: 12.1		RDS: 090-3
DEPARTMENTS / GROUP NAME:	TSTS HUB	SPACE TYPE: SHARED SPACE			SPACE NAME: AUDITORIUM
CONTAINMENT RISK LEVEL:	N/A	OPERATING HOURS:	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:		ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			



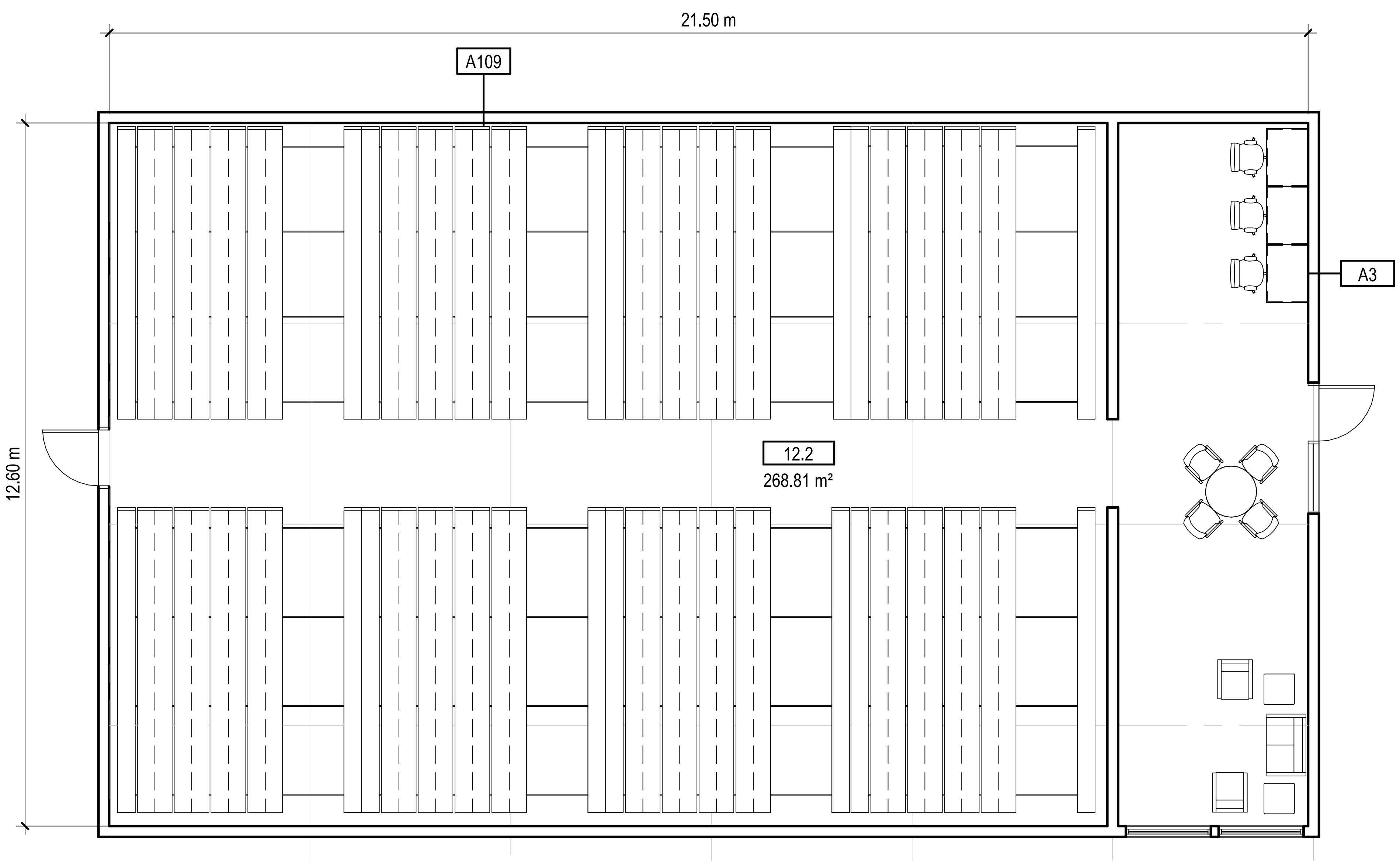
REVISION # & ISSUE DATE: REV 4, 20/05/2021	DEPARTMENTS / GROUP NAME: TSB HO + TSTS HUB	SPACE TYPE: ADMIN SPS	NUMBER OF PEOPLE:	SPACE ID#: 12.2	**RDS-091-1**
CHIEF : ________________________________	ADDITIONAL USER COMMENTS:			AREA (m2): 268.81	**Space Name: RESOURCE CENTRE**
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			OPERATING HOURS: 8AM-5PM		

ROOM FUNCTION AND ACTIVITES:

LIBRARY C/W HIGH DENSITY SHELVING, WORKBENCHES AND SEATING.

ARCHITECTURAL	SUSTAINABILITY REQUIREMENT	FIRE PROTECTION / ALARM
FLOORING FLOOR FINISH: CARPET TILE FLOOR BASE: RUBBER		WET PIPE SPRINKLER SYSTEM VISUAL/AUDIBLE ALARM SIGNALS TO NBCC
WALL SYSTEM	**SPECIAL DESIGN CONDITIONS**	**ELECTRICAL / POWER**
GYPSUM BOARD PARTITION (PAINT FINISH) ACOUSTIC LEVEL: SPEECH SECURE		NORMAL POWER RECEPTACLES
CEILING	**ACCESSIBILITY REQUIREMENT**	**LIGHTING**
ACOUSTIC TILE (3000 mm AFF)		RECESSED LIGHTING OCCUPANCY/VACANCY SENSOR 3500K
CASEWORK / MILLWORK	**PLUMBING**	**SECURITY**
	DRAINS AND/OR FIXTURES NOT EXPECTED	Refer to Appendix N - Protected B "RDS Security Input" document issued by LabCanada Security Team.
WINDOWS / DAYLIGHTING	**MECHANICAL**	**COMMUNICATIONS**
NATURAL DAYLIGHTING PREFERRED, OPERABLE WINDOWS C/W SHADE CONTROL	SETPOINTS 25C +/- 1C SUMMER, 21C +/- 1C WINTER DEMAND CONTROL VENTILATION 30% MINIMUM RH WINTER, 60% MAXIMUM RH SUMMER ROOM TEMPERATURE CONTROL ZONE HUMIDITY CONTROL SCHEDULED NIGHT SETBACK ROOM PRESSURIZATION, NEUTRAL/NOT MONITORED HEATING/COOLING TERMINAL SYSTEM PENDING ANALYSIS MECHANICAL NOISE: NC30	DATA OUTLET PHONE OUTLET WIFI
DOORS/ HARDWARES		**STRUCTURAL**
DOOR TYPE: WOOD, GLAZING ON SIDELIGHT - CLEAR TEMPERED GLASS OR FILM DOOR WIDTH (min): 1000mm WITH 915mm SIDELIGHT DOOR HARDWARE: ACOUSTIC SEALS		FLOOR LOADING IMPLICATIONS (DEAD): 2.0 kPa FLOOR LOADING IMPLICAITIONS (LIVE): 7.2 kPa Superimposed dead loads to be confirmed at SD

REVISION # & ISSUE DATE: REV 4, 20/05/2021		SPACE ID #: 12.2	RDS: 091-2
DEPARTMENTS / GROUP NAME: TSB HO + TSTS HUB	SPACE TYPE: ADMIN SPS		SPACE NAME: RESOURCE CENTRE
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY		



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091-2

12.2 - RESOURCE CENTRE

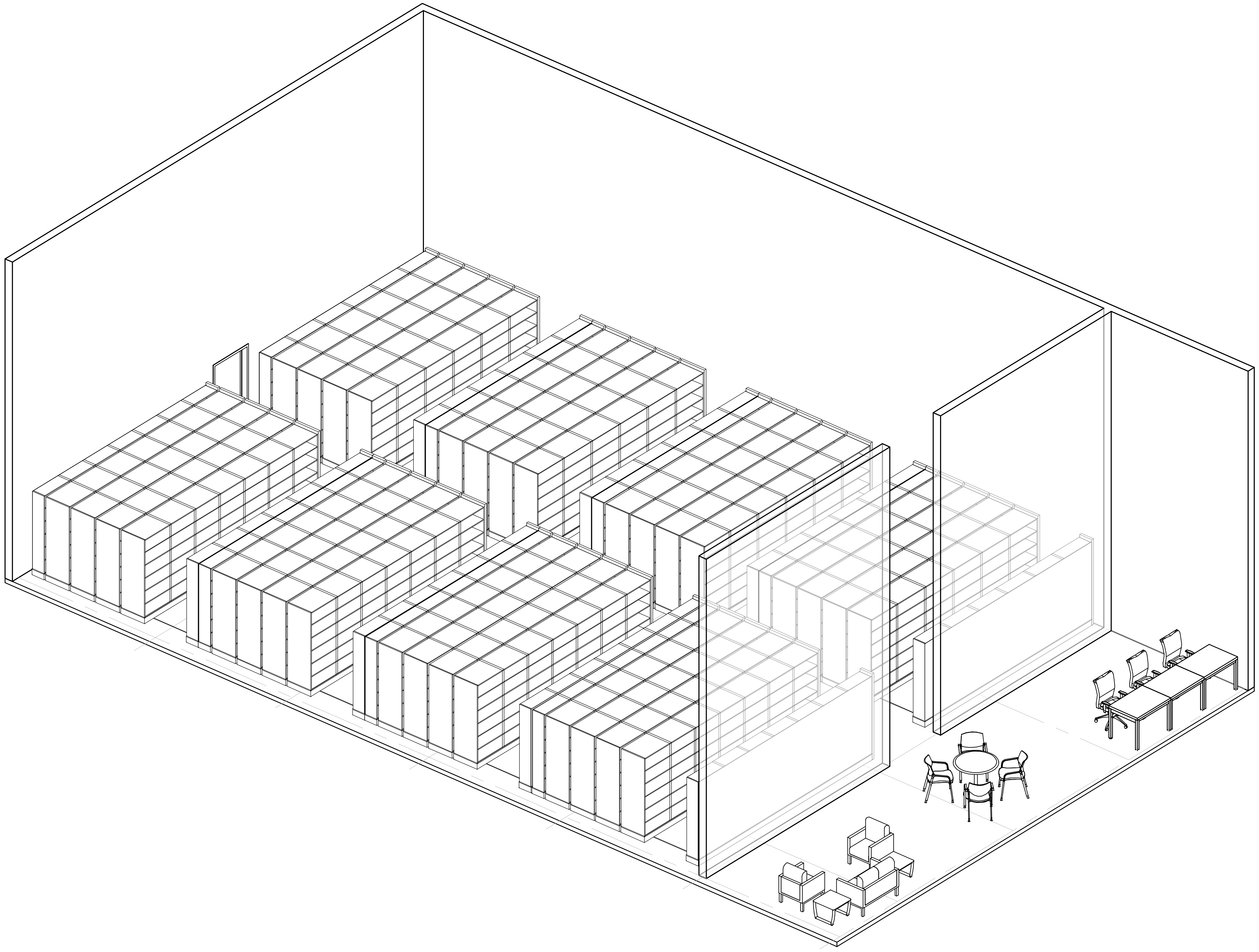
1 : 100

LEGEND

ARCHITECTURAL SYSTEMS		UTILITIES / SYSTEMS	
A3	WORKBENCH, STATIONARY		
A109	HIGH DENSITY SHELVING		

SPECIALTY EQUIPMENT

REVISION # & ISSUE DATE: REV 4, 20/05/2021		SPACE ID #: 12.2		**RDS: 091-3**
DEPARTMENTS / GROUP NAME: TSB HO + TSTS HUB	SPACE TYPE: ADMIN SPS			**SPACE NAME: RESOURCE CENTRE**
CONTAINMENT RISK LEVEL:	OPERATING HOURS: 8AM-5PM	LAB CERTIFICATION REQUIREMENTS:		
REQUIRED ADJACENCIES:	ROOM — PRIMARY ADJACENCY — SECONDARY ADJACENCY — TERTIARY ADJACENCY			

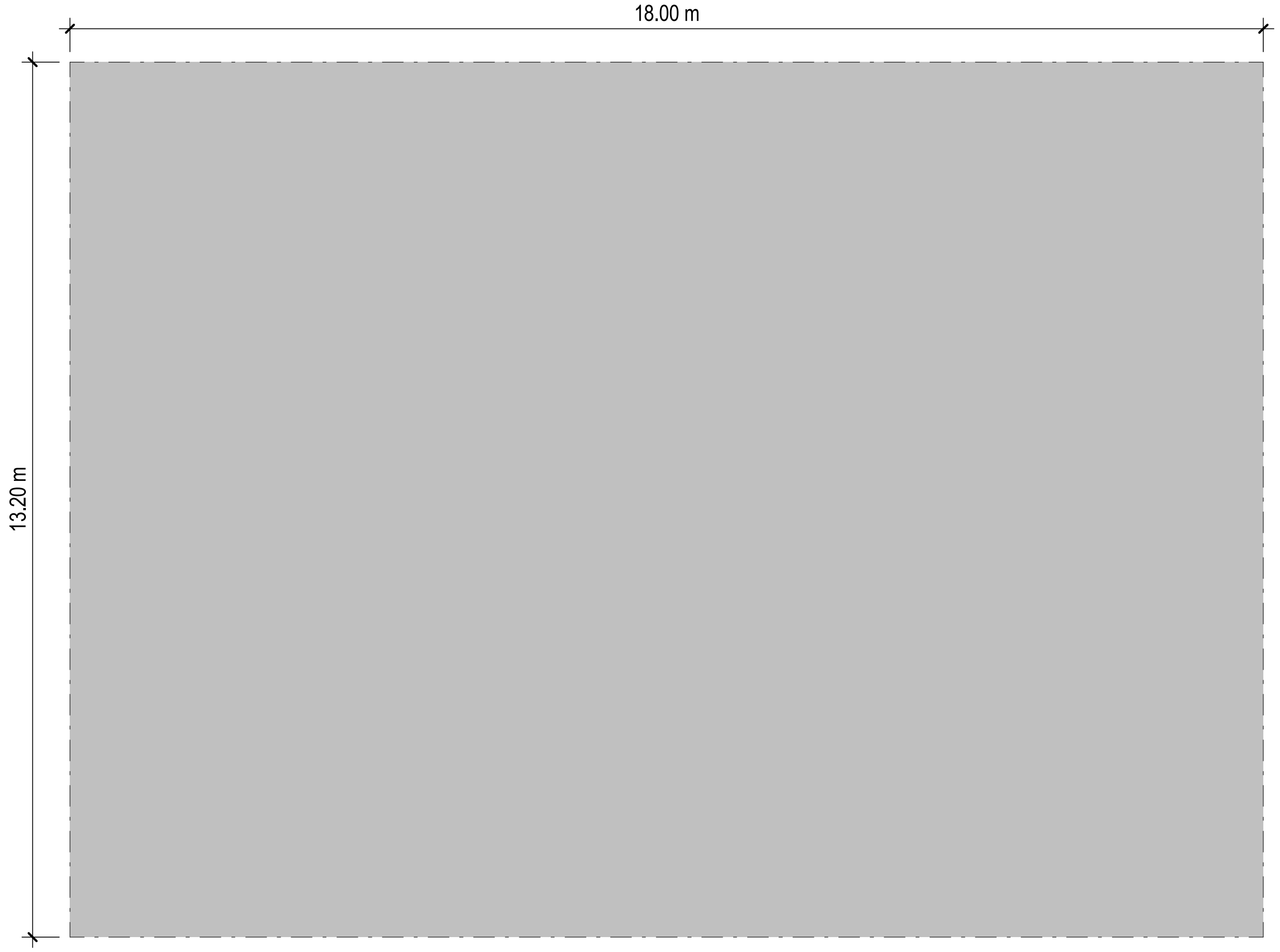


REVISION # & ISSUE DATE: REV 3, 20/05/2021	DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: OUTDOOR YARD	NUMBER OF PEOPLE:	SPACE ID#: 13.1	RDS-095-1
CHIEF : ______________________________	ADDITIONAL USER COMMENTS:			AREA (m2): 237.6	Space Name: COVERED STORAGE
CMO REP: Ann Marie Sibbald					
LC REP: Sophie Harvey			OPERATING HOURS: 24 HOURS		

ROOM FUNCTION AND ACTIVITES:

ARCHITECTURAL	SUSTAINABILITY REQUIREMENT	FIRE PROTECTION / ALARM
FLOORING		VISUAL/AUDIBLE ALARM SIGNALS TO NBCC FIRE SUPPRESSION SYSTEM NOT EXPECTED
WALL SYSTEM	**SPECIAL DESIGN CONDITIONS**	**ELECTRICAL / POWER**
		NORMAL POWER RECEPTACLES
CEILING	**ACCESSIBILITY REQUIREMENT**	**LIGHTING**
		SURFACE MOUNTED LIGHTING 3500K
CASEWORK / MILLWORK	**PLUMBING**	**SECURITY**
	DRAINS AND/OR FIXTURES NOT EXPECTED	
WINDOWS / DAYLIGHTING	**MECHANICAL**	**COMMUNICATIONS**
	HEATING, COOLING, AND MECHANICAL VENTILATION NOT EXPECTED	
DOORS/ HARDWARES		**STRUCTURAL**
		FLOOR LOADING IMPLICATIONS (DEAD): 0.5 kPa FLOOR LOADING IMPLICAITIONS (LIVE): 7.2 kPa Superimposed dead loads to be confirmed at SD

REVISION # & ISSUE DATE: REV 3, 20/05/2021		SPACE ID #: 13.1	**RDS: 095-2**
DEPARTMENTS / GROUP NAME: NRC	SPACE TYPE: OUTDOOR YARD		**SPACE NAME: COVERED STORAGE**
CONTAINMENT RISK LEVEL:	OPERATING HOURS:	LAB CERTIFICATION REQUIREMENTS:	
REQUIRED ADJACENCIES:			



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095-2

13.1 - COVERED STORAGE

1 : 100

LEGEND

ARCHITECTURAL SYSTEMS	UTILITIES / SYSTEMS

SPECIALTY EQUIPMENT	

Appendix F AREA TABULATION – NON-SCIENCE

TSTS HUB AND TSB HO PUBLIC AND CLIENT SHARED SPACES AREA TABULATION							
	Space ID	Room/Space Name	SHARED Client Space	Number of spaces	Net Area Functional in SQM	Total Net Area Functional	Notes
BASE BUILDING INFRASTRUCTURE		Entrance/Lobby	Public Space	1	150	150.00	Accessible by General Public
		Reception	Public Space	1	25	25.00	Accessible by General Public
		Waiting Area	Public Space	1	25	25.00	Accessible by General Public
	11.1	Security Area	Public Space	1	35	35.00	Accessible by Staff
PUBLIC ENGAGEMENT		Display - Interpretative Centre	Public Space	1	25	25.00	Accessible by General Public
		Informal Gathering/Event Space	Public Space	1	150	150.00	Accessible by General Public
		Universal Accessible Washroom	Public Space	1	12	12.00	Accessible by General Public
		Total Net Area Public Spaces				**422.00**	
SHARED TSTS +TSB HO		Wellness Room/Nursing Room/First Aid	Shared TSTS + TSB HO	1	24	24.00	Accessible by Staff and visitors
	12.2	Centralized Resource Centre	Shared TSTS + TSB HO	1	270	270.00	Accessible by Staff and visitors
		Total Net Area Shared TSTS + TSB HO				**294.00**	
SHARED TSTS		Lunchroom	Shared TSTS	1	52	52.00	Accessible by Staff
	12.1	Auditorium	Shared TSTS	1	235	235.00	Accessible by Staff and visitors
	12.1C	Storage Room for auditorium	Shared TSTS	1	13	13.20	Accessible by Staff and visitors
	12.1D	A/V Control Room	Shared TSTS	1	19	19.00	Accessible by Staff and visitors
	12.1E	Auditorium Kitchennette Support	Shared TSTS	1	20	20.00	Accessible by Staff and visitors
		Decentralized Resource Centre	Shared TSTS	3	15	45.00	Accessible by Staff
		Server / Computer Room	Shared TSTS	1	57	57.00	Accessible by Staff
		Total Net Area Client Shared TSTS				**441.20**	

TSB HO AREA TABULATION							
	Space ID	Room/Space Name	Space Type	Number of spaces	Net Area Functional in SQM	Total Net Area Functional in SQM	Notes
CHAIR + BOARD + COO - CUSTOM WORKPOINT	6.1A	Chair (Deputy Minister Equivalent)	Office	1	37.00	37.00	As per SOR - Custom Workpoint
	6.1B	Chair Washroom	Private Washroom	1	11.00	11.00	As per SOR - Custom Workpoint
		Chair Meeting Room	Private Meeting Room with waiting area	1	40.00	40.00	As per SOR - Custom Workpoint
		Chair Kitchenette	Private Kitchenette	1	20.00	20.00	As per SOR - Custom Workpoint
		Chair Equipment Area	Private Equipment Area	1	7.50	7.50	As per SOR - Custom Workpoint
	6.2	Office COO	Private Enclosed Office	1	18.50	18.50	As per SOR - Custom Workpoint
	6.2	Members of Boards Enclosed Office	Private Enclosed Office	4	18.50	74.00	As per SOR - Custom Workpoint
			SubTotal Chair+Board+COO			**208.00**	
INDIVIDUAL		Workstation	Primary Individual Open	80	3.50	280.00	
		Touchdown	Primary Individual Open	14	1.50	21.00	
		Focus Room	Primary Individual Enclosed	14	7.50	105.00	If space allows these rooms can increase in size up to 10 SQM maximum
		Focus Pod	Primary Individual Open	3	4.00	12.00	
		Reflection Point	Secondary Individual Open	2	5.00	10.00	
		Active Workstation	Secondary Individual Open	0	5.00	0.00	
		Phone Booth	Secondary Individual Enclosed	7	5.00	35.00	
			SubTotal Individual Spaces			**463.00**	
COLLABORATIVE		Teaming Area	Collaborative Open	1	15.00	15.00	
		Lounge	Collaborative Open	2	20.00	40.00	
		Workroom	Collaborative Enclosed	6	15.00	90.00	
		Project Room	Collaborative Enclosed	0	20.00	0.00	
		Medium Meeting Room	Collaborative Enclosed	3	30.00	90.00	
		Large Meeting Room	Collaborative Enclosed	2	60.00	120.00	
		Chat Point	Collaborative Open	2	3.00	6.00	
		Huddle	Collaborative Open	2	8.00	16.00	
			SubTotal Collaboorative Spaces			**377.00**	
SUPPORT SPACES		Kitchen	Support Space	1	15.00	15.00	
		Equipment Area	Support Space	3	5.00	15.00	
		Locker Area TSB H.O	Support Space	156	0.50	78.00	
		Shared Storage	Support Space	1	10.00	10.00	
		Telecom	Support Space	1	10.00	10.00	
			SubTotal Support Spaces			**128.00**	
SPECIAL PURPOSE SPACE	10.1	Records/ Filing	Admin SPS	1	61.00	61.00	Modified Area
	10.2	Special Clothing Equipment	Admin SPS	1	29.30	29.30	As per SOR
	10.3	IT Equipment	Admin SPS	1	24.80	24.80	As per SOR
	10.4	Communication Equipment	Admin SPS	1	11.90	11.90	As per SOR
	10.5	Administrative Equipment	Admin SPS	1	19.50	19.50	As per SOR
	10.7	Telecom and Server Room	Admin SPS	1	35.00	35.00	As per SOR
	5.5	Deployment Kit Storage	Admin SPS	1	22.50	22.50	Requested - SPS created by reducing area for Records/Filing and combined with TSTS PPE RDS 056
	10.9	Training Equipment Storage	Admin SPS	1	12.00	12.00	Requested - SPS created by reducing area for Records/Filing
		Total Net Area Special Purpose Spaces				**216.00**	
		Total Net Area TSB HO				**1,392.00**	

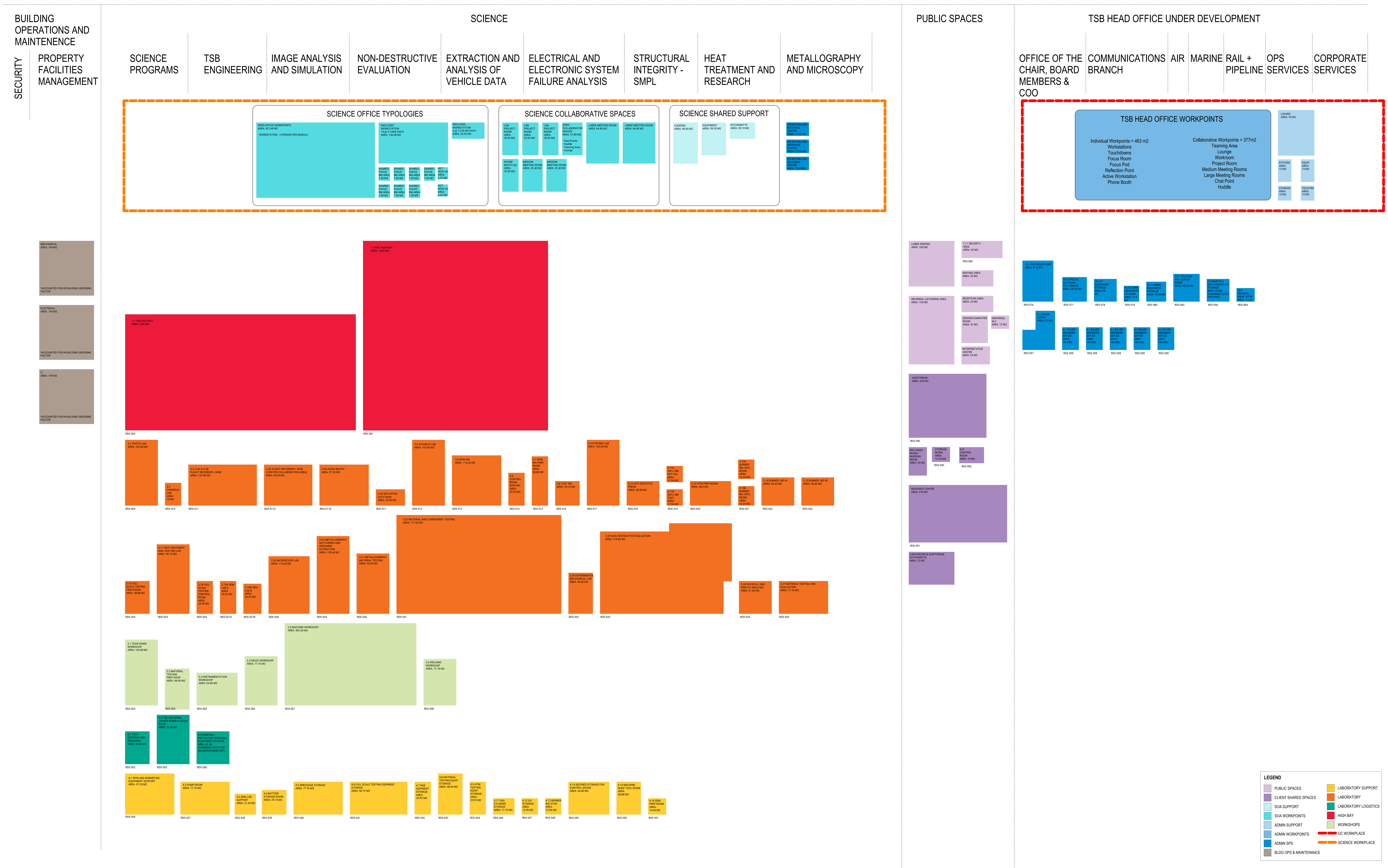
Appendix G AREA TABULATION – SCIENCE

SOA AREA TABULATION						
	Room/Space Name	**Space Type**	**Number of spaces**	**Net Area Functional in SQM**	**Total Net Area Functional in SQM**	**Notes**
INDIVIDUAL WORKPOINTS	Shared Science Focus Room	Enclosed Individual	7	7.50	52.50	
	Open Office Work point (2 person per module)	Primary individual open	66	6.48	427.68	One module is (3.6 x 3.6 = 12.96 SQM)
	Hot Desk (4 preson per module)	Primary Individual Open	8	3.24	12.44	Reduction Factor 0.48 - Standard SOA
	Enclosed Workstation (Trans. Safety, Matls Perf.)	Enclosed Individual	14	9.72	136.08	
	Enclosed Workstation (Trans. Safety, Matls Perf.)	Enclosed Individual	2	12.96	25.92	
		Total Individual Workpoints			**654.62**	
COLLABORATIVE WORKPOINTS	Chat Point	Collaborative Open	4	4.32	17.28	Calculated at 0.59 SQM per FTE
	Huddle	Collaborative Open	4	6.48	25.92	
	Teaming Area	Collaborative Open	1	14.62	14.62	
	Lounge	Collaborative Open	0	0.00	0.00	
	Phone booth	Collaborative Enclosed	6	4.32	25.92	
	Small Meeting Room	Collaborative Enclosed	0	16.20	0.00	
	Lab Project Room (2 modules = 3.6x7.2)	Collaborative Enclosed	3	25.92	77.76	
	Medium Meeting Room	Collaborative Enclosed	2	32.40	64.80	
	Large Meeting Room	Collaborative Enclosed	2	64.80	129.60	
	Extra Large Meeting Room	Collaborative Enclosed	0	194.40	0.00	
		Total Collaborative Workpoints			**355.90**	
SUPPORT SPACES	Kitchenette (5m2/25 person)	Support Space	1	19.60	19.60	
	Equipment (10m2/25 person)	Support Space		39.20	39.20	
	Lockers (0.5m2/person unassigned)	Support Space		49.00	49.00	
		Total Support Spaces			**107.80**	
		Total SOA spaces			**1,118.32**	

TSTS SCIENCE AREA TABULATION							
Space ID Number	Room/Space Name	Space Type	Number of spaces	Total Net Area in SQM- Master Programming	Net Area Functional IN SQM	Difference IN SQM	Notes
			High Bay Laboratory				
1.1	NRC High Bay		1	1,600.00	1,600.00	0.00	
	Includes open shelving, portable control room area						
1.2	TSB High Bay		1	1,250.00	1,250.00	0.00	
	Includes open shelving, decontamination area						
	Sub-Total			**2,850.00**	**2,850.00**	**0.00**	
			Workshops				
2.1	Tear down Workshop		1	103.68	103.68	0.00	
2.2	Material Testing Prep Shop		1	38.88	48.60	9.72	New eq.added A104 - Paint Booth (2.5m x 2m) footprint
2.3	Instrumentation Workshop		1	64.80	64.80	0.00	
2.4	Wood Workshop		1	51.84	77.76	25.92	Area increased due to equipment. Area reflects detailed layout provided by TSTS Hub
2.5	Machine Workshop		1	388.80	503.50	114.70	Includes Machine Shop Storage Area
2.5A	Machine Workshop Interior Office		1	0.00	12.68	12.68	New SPS Space - Lab Office
2.6	Welding Workshop		1	77.76	77.76	0.00	
	Sub-total			**725.76**	**888.78**	**163.02**	
			Laboratories				
3.1	Photo Lab Studio (Open Photo/Studio Area)		1	103.68	103.68	0.00	
3.1A	Photo Lab Studio (Soundproof Room A)		1	included in 3.1	included in 3.1	0.00	
3.1B	Photo Lab Studio (Soundproof Room B)		1	included in 3.1	included in 3.1	0.00	
3.2	Chemical Lab		1	12.96	18.00	5.04	
3.3	Flight Recorder + NVM (Open Lab Area)		1	155.52	132.36	-23.16	
3.3A	Flight Recorder + NVM (Disassembly Area)		1	included in 3.3	included in 3.3	0.00	
3.3B	Flight Recorder + NVM (Storage Area)		1	included in 3.3	included in 3.3	0.00	
3.3C	Flight Recorder + NVM (CVR/FDR Collaboration area)		2	0.00	93.60	93.60	New space in FP - SPS Lab Office
3.3D	Audio Booth (Includes Reference Wortable)		6	0.00	97.20	97.20	New space in FP - SPS Lab Office
3.3E	SPS Office Suite NVM		1	0.00	23.00	23.00	New space in FP - SPS Lab Office
3.3F	Flight Recorder + NVM (Vestibule-Corridor-Open Collaboration Suite Area)		1	0.00	0.00	0.00	Identified space - Grossing Factor Area
3.4	Avionics Lab		1	103.68	103.68	0.00	
3.5A	Spin Rig Test Cell		1	64.80	77.76	12.96	Equipment ideal area in MP (5x13) at FP (6x15)
3.5B	Spin Rig Vacuum Skid		1	included in 3.5A	38.88	38.88	including vacuum skid. Layout updated to match manufacturers sketches provided
3.6	Control Room Spin Rig		1	12.96	25.92	12.96	Equipment ID 383 (7015mm x 2745mm) requires larger area than anticipated in MP to fit within the room
3.7	Spin Rig Prep Room		1	25.92	38.88	12.96	
3.8	TGST Rig		1	25.92	29.16	3.24	
3.9	HTM R&D Lab		1	103.68	103.68	0.00	
3.10	Hot Isostatic Press		1	38.88	38.88	0.00	
3.11A	Control Room Hot Iso Press		1	12.96	12.96	0.00	
3.11B	Control Room TGST Rig		1	0.00	12.96	12.96	New Control Room identified during FP
3.12	HTM Prep Room		1	38.88	48.60	9.72	
3.13A	Burner Rig Control Room #1		1	19.44	16.34	-3.10	
3.13B	Burner Rig Control Room #2		1	19.44	16.34	-3.10	
3.14	Burner Rig #1		1	38.88	44.64	5.76	
3.15	Burner Rig #2		1	38.88	44.64	5.76	
3.16	Full Scale Testing Prep Room		1	38.88	38.88	0.00	
3.17	Heat Treatment and Coating Lab		1	90.72	109.44	18.72	Area increased due to equipment and planning grid
3.18	Full Scale Testing Control Room		1	25.92	25.92	0.00	
3.19A	SEM Lab A		1	19.44	26.42	6.98	Area increased due to planning grid
3.19B	SEM Lab B		1	19.44	26.42	6.98	Area increased due to planning grid
3.20	Microscope Lab		1	155.52	113.40	-42.12	
3.21	Metallographic (Sectioning and Specimen Extraction)		1	116.64	95.04	-21.60	
3.22	Metallographic (Sample Preparation)		1	51.84	109.44	57.60	Area increased due to equipment.
3.22A	Metallographic (Sample Storage 1)		1	0.00	5.60	5.60	New Room inside the lab added in workshop #4
3.22B	Metallographic (Sample Storage 2)		1	0.00	5.60	5.60	New Room inside the lab added in workshop #4
3.23	Material and Component Testing		1	777.60	777.60	0.00	
3.24	Experimental Mechanics Lab		1	64.80	48.60	-16.20	
3.25	Non Destructive Evaluation (Open Area)		1	375.84	304.17	-71.67	
3.25A	Non Destructive Evaluation (MPI/LPI Lab Area)		1	0.00	44.02	44.02	New Room identified in workshop # 4
3.25B	Non Destructive Evaluation (Observation X-ray Area)		1	included in 3.25	68.33	68.33	
3.25C	Non Destructive Evaluation (X-Ray Room A)		1	included in 3.25	46.13	46.13	
3.25D	Non Destructive Evaluation (X-Ray Room B)		1	0.00	56.17	56.17	New Room identified in workshop # 4
3.26	Physical and Fracto Analysis Room		1	51.84	51.84	0.00	
3.27	Material Testing and Evaluation		1	77.76	77.76	0.00	
	Sub-Total			**2,682.72**	**3,151.94**	**469.22**	
			Laboratories Support				
4.1	Spin and Burner Rig Equipment Support Room		1	64.80	97.20	32.40	
4.2	Pump Room		1	77.76	77.76	0.00	
4.3	SEM Lab Support Room		1	12.96	21.64	-8.68	
4.4	Battery Storage Room		1	25.92	29.16	3.24	
4.5	Wreckage Storage		1	77.76	77.76	0.00	
4.6	Full Scale Testing Equipment Storage		1	90.72	90.72	0.00	
4.7	NDE Equipment Storage		1	25.92	25.92	0.00	
4.8	Material Testing Equipment Storage		1	38.88	48.60	9.72	
4.9	HTM Testing Equipment Storage		1	25.92	25.92	0.00	
4.10	SEM Service Storage - Eliminated		1	12.96	0.00	-12.96	Removed form Program
4.11	Gas Cylinder Storage		1	12.96	17.10	4.14	Outside Storage
4.12	Oil Storage Room		1	12.96	12.96	0.00	Outside OR Inside clarify Storage
4.13	Burner Rig Storage		1	12.96	12.96	0.00	
4.14	Secured Storage for Control Goods		1	64.80	64.80	0.00	
4.15	Machine Shop Tool Room		1	25.92	38.88	12.96	
4.16	SEM Prep Room		1	38.88	14.40	12.96	Rename space
	Subtotal			**622.08**	**655.78**	**40.82**	
			Logistics Support				
5.1	TSTS Shipping and Receiving		1	64.80	38.88	-25.92	Synergy with NRC. Only 1 space require
5.2	NOT USED		1	0.00	0.00	0.00	Combined with 5.1
5.3	NOT USED		1	0.00	0.00		
5.4	Universal Locker Area and Clean Room		1	64.80	71.44	6.64	Combined with 5.4
5.5	Protective Personal Equipment Storage		1	51.84	51.84	0.00	Combined SPS TSB HO - Deployment Kit RDS 083
	Subtotal			**181.44**	**162.16**	**-19.28**	
	Total Science Spaces			**7,062.00**	**7,708.66**	**646.66**	
	Total Office Spaces inside Labs			**0.00**	**226.48**	**0.00**	

Appendix H **BROWN SHEET**

FUNCTIONAL PROGRAMMING V2



Appendix I FLOW DIAGRAM ADJACENCY

FRAMEWORK

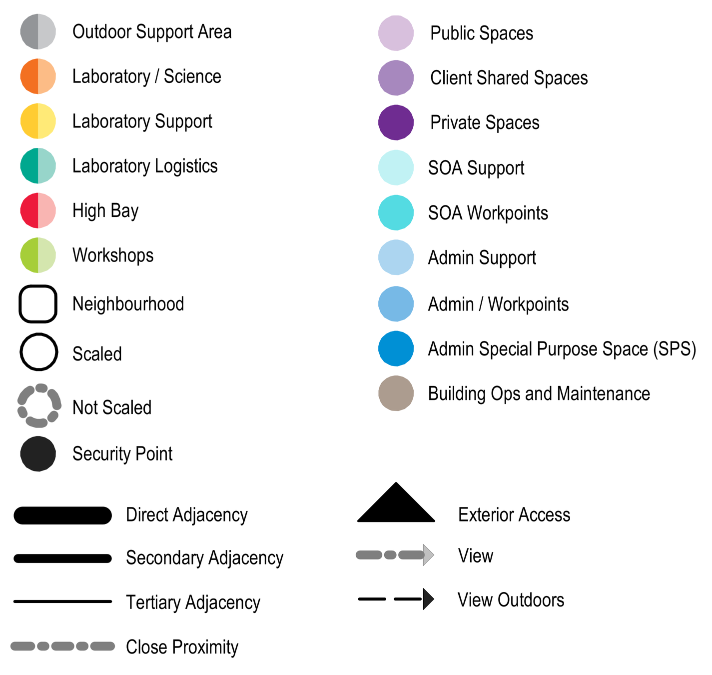
TSTS ADJACENCY DIAGRAM

NON SCIENCE DIAGRAMS

TSTS HUB

(v.2)

LEGEND



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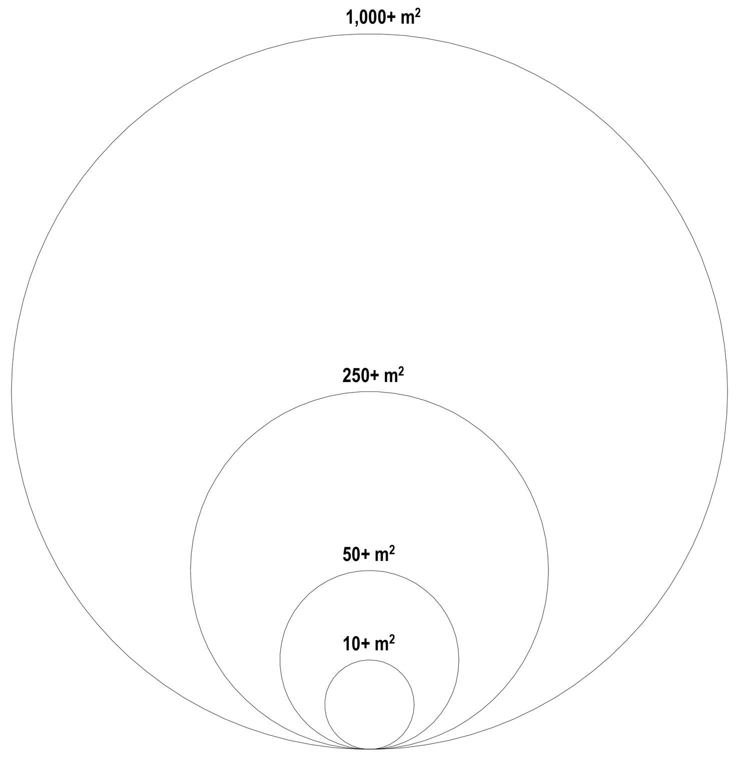
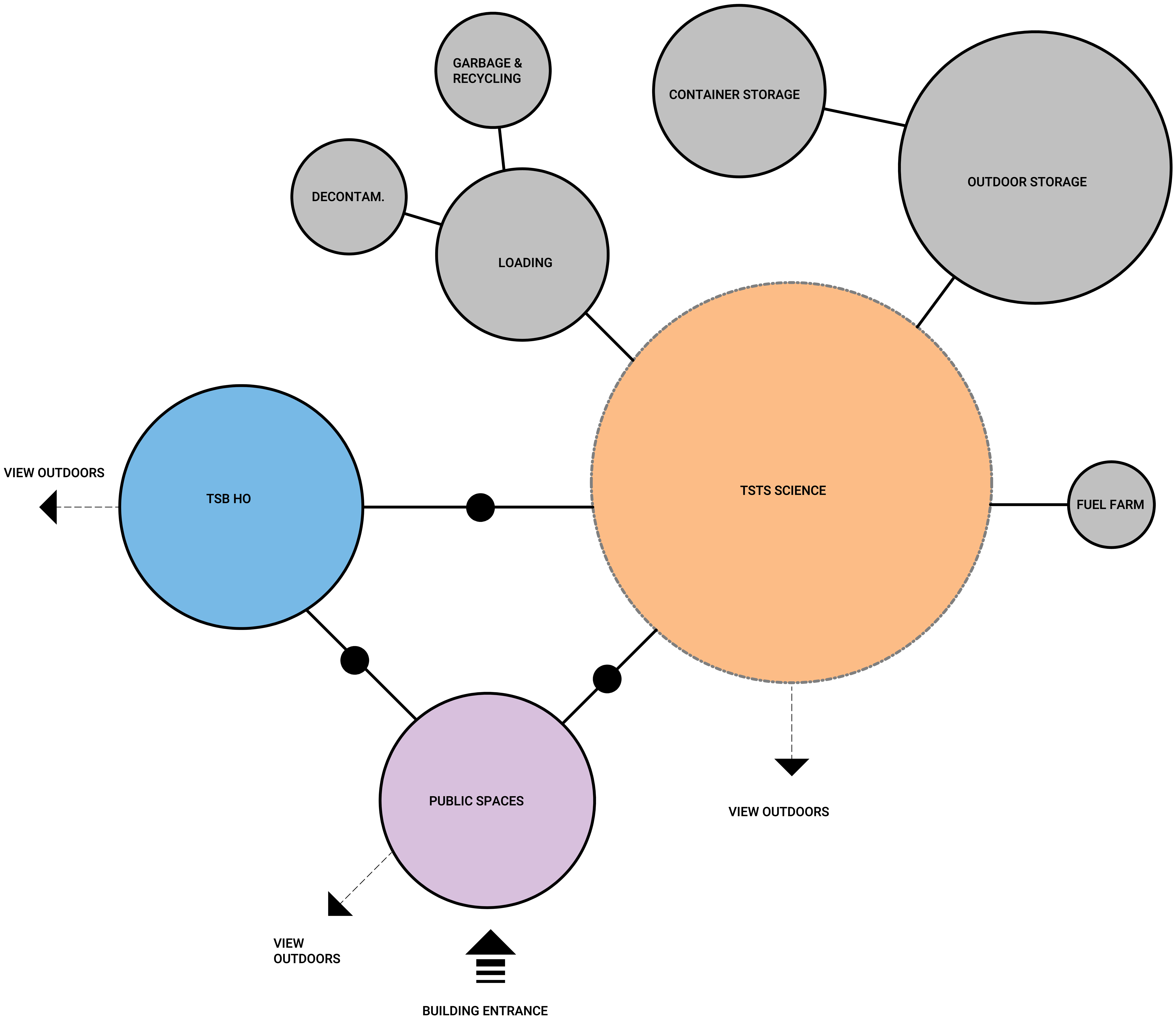




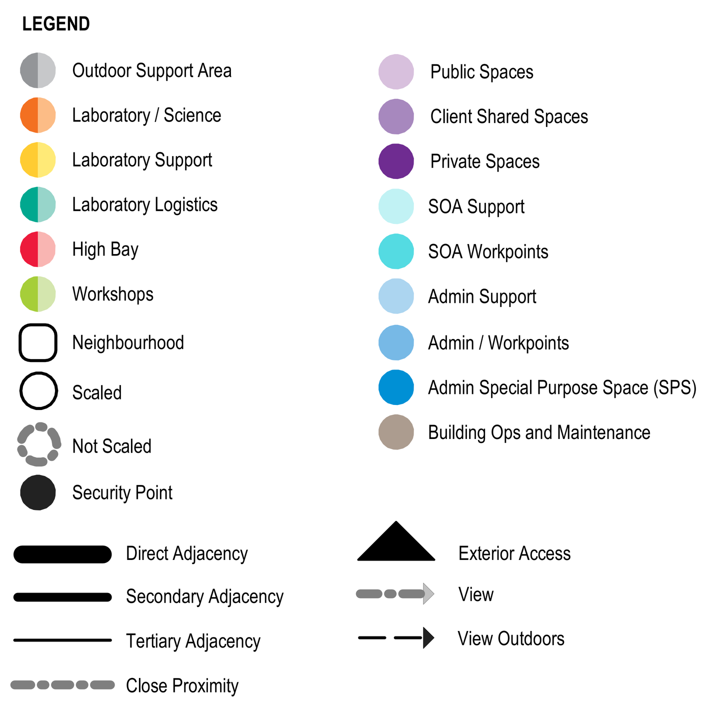
FRAMEWORK

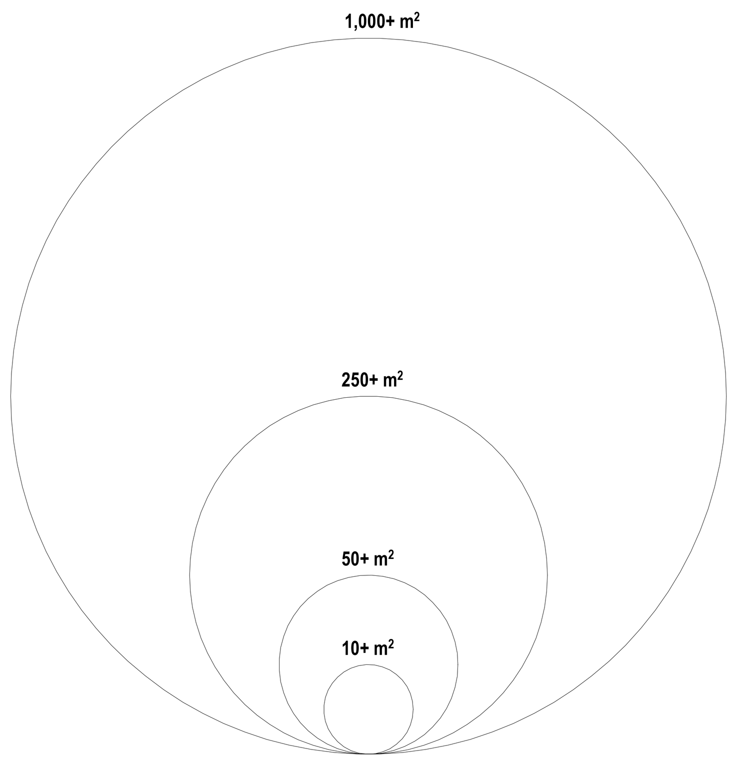
TST ADJACENCY DIAGRAMS

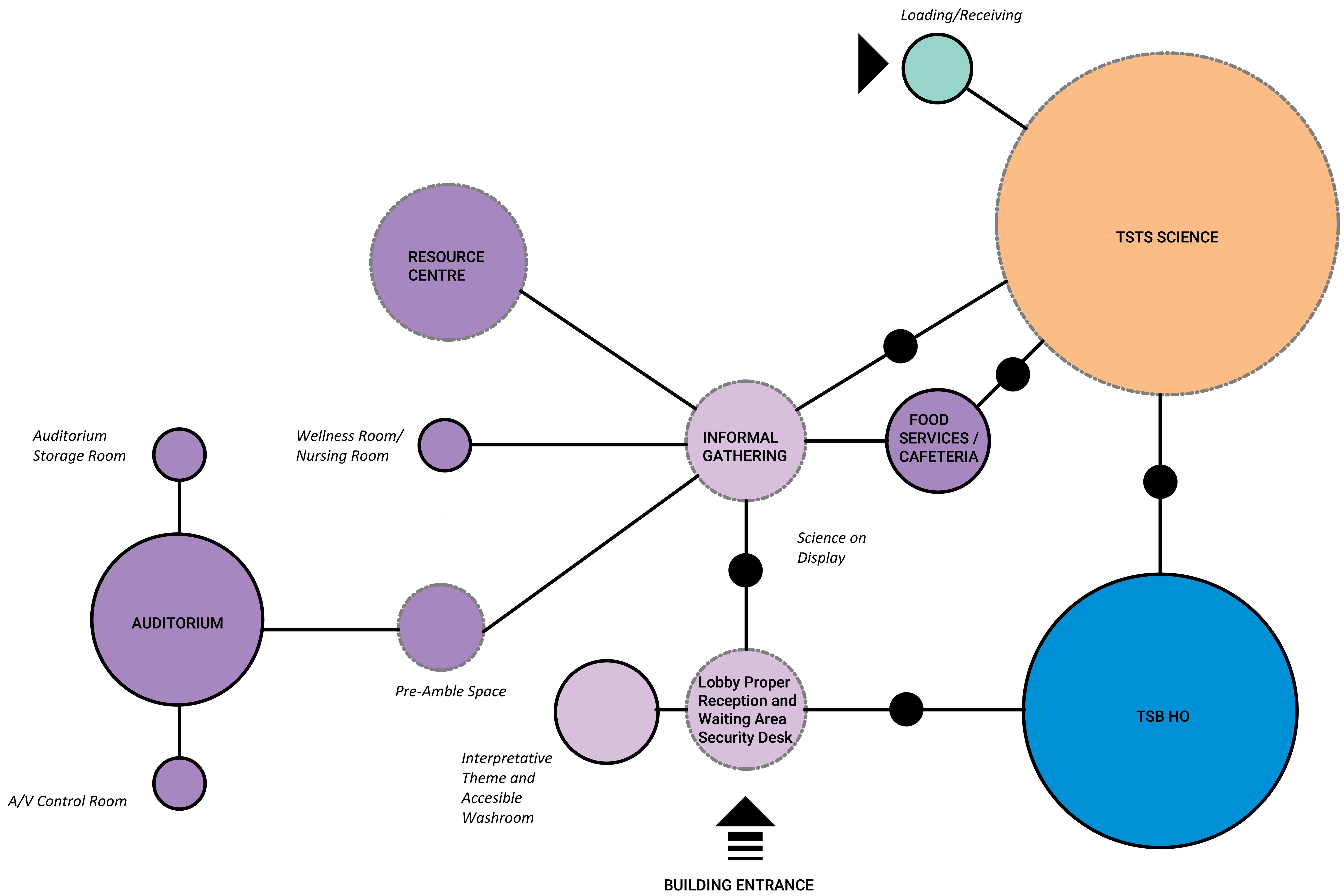
NON SCIENCE DIAGRAMS

PUBLIC SPACES

(v.2)







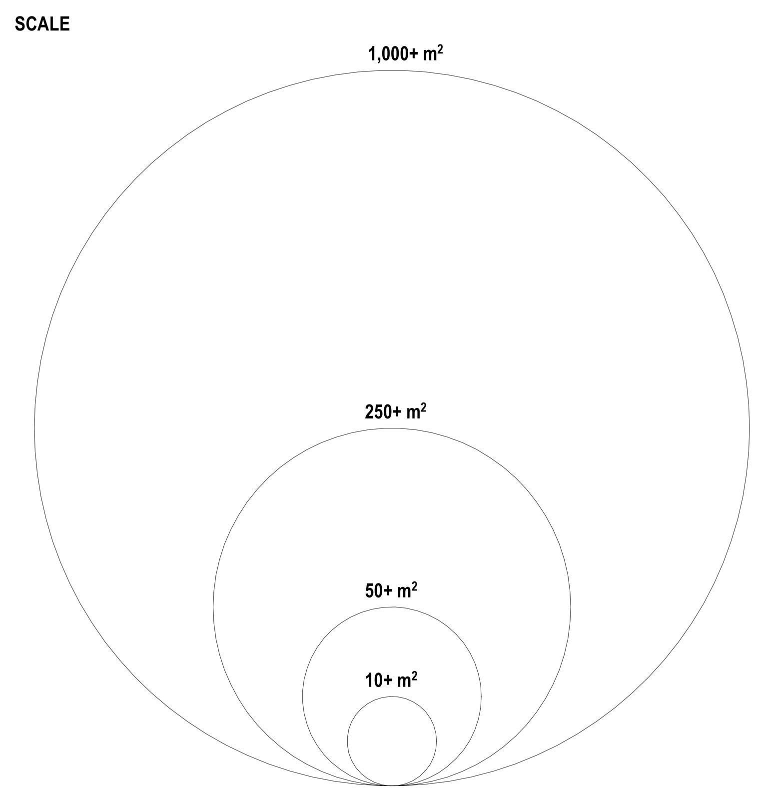
FRAMEWORK

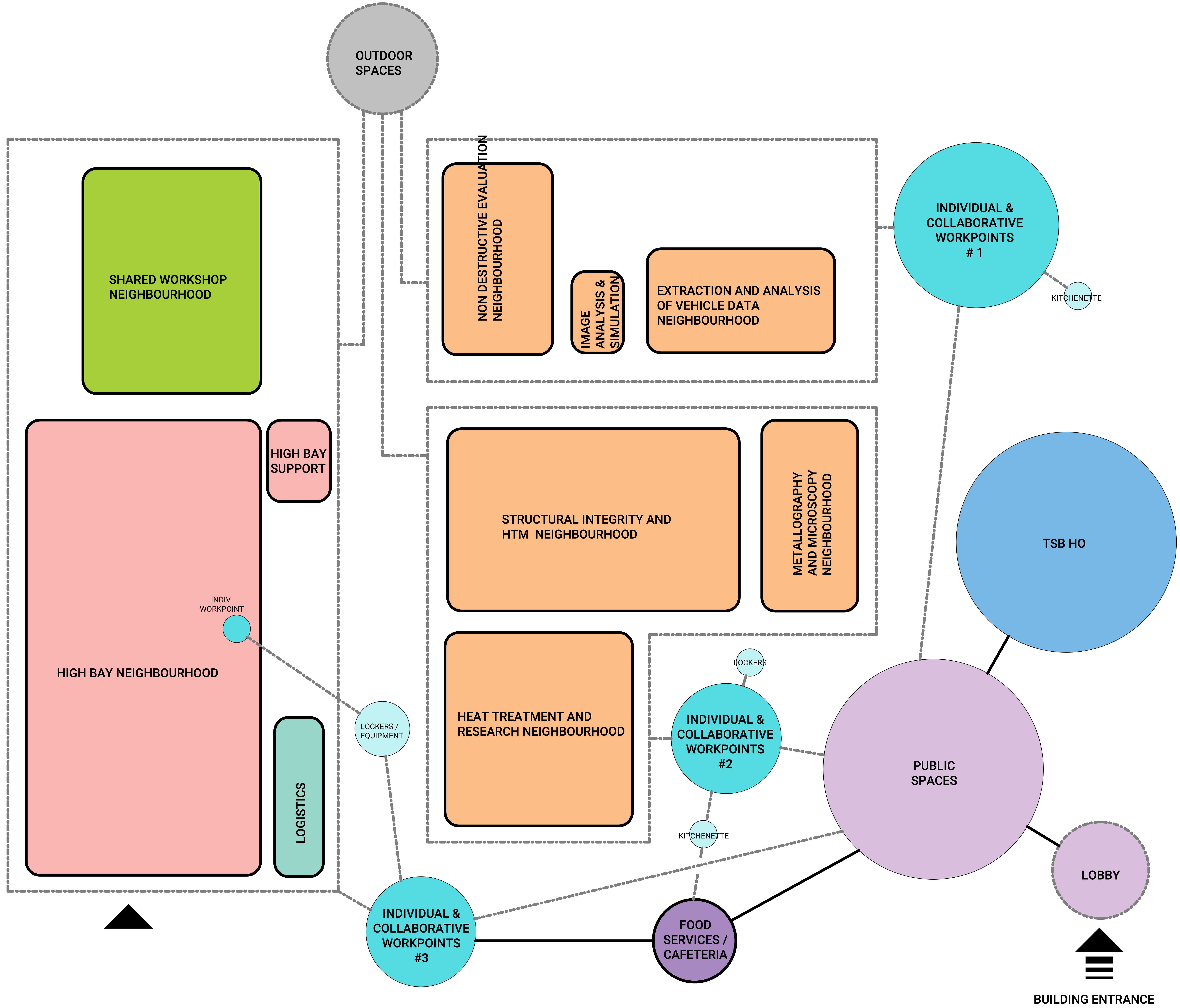
TSTS ADJACENCY DIAGRAM

SCIENCE OFFICES

SCIENCE OFFICES

(v.2)





FRAMEWORK

TSTS ADJACENCY DIAGRAM

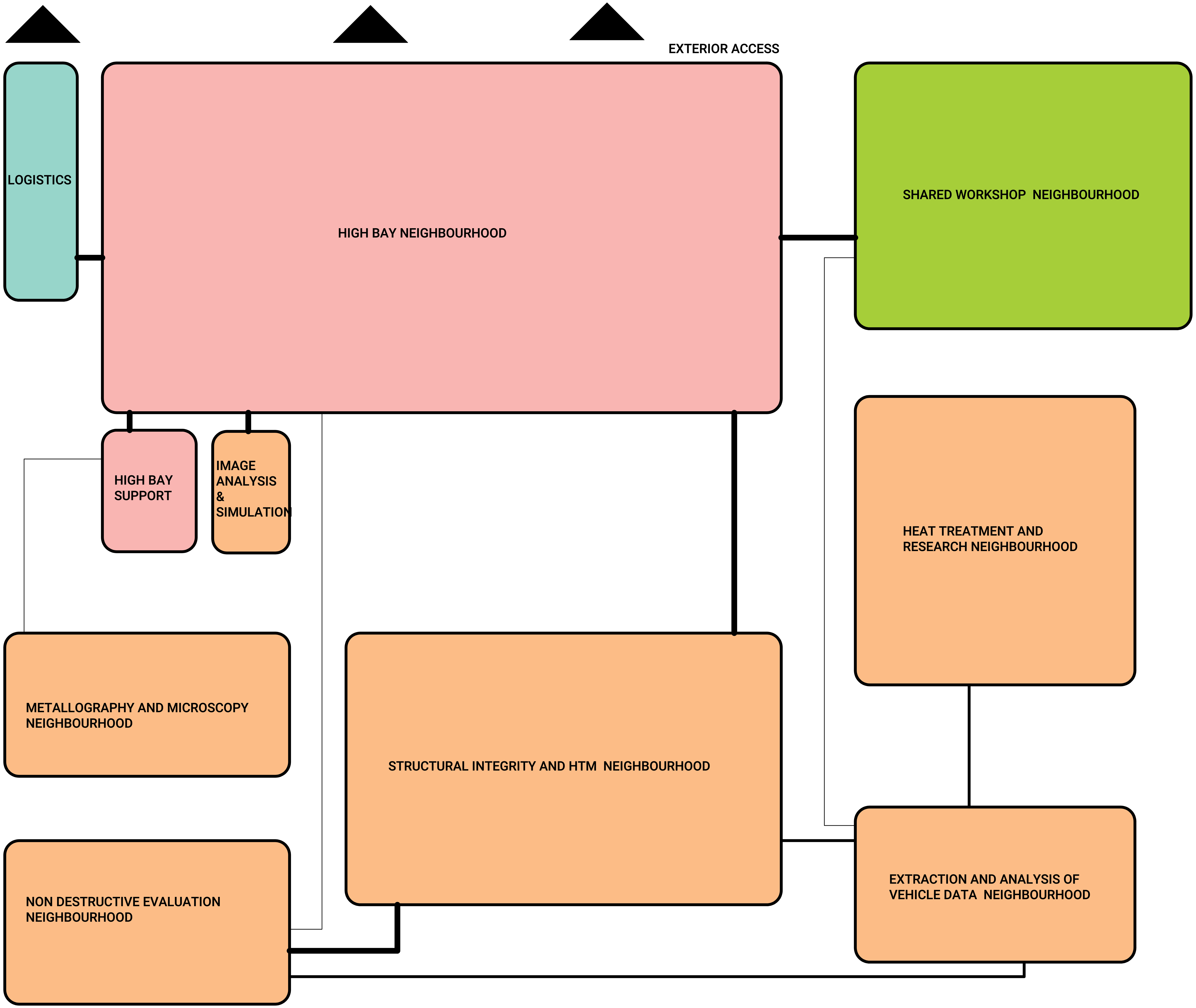
SCIENCE DIAGRAM

SCIENCE NEIGHBOURHOOD

(v.2)

LEGEND

- Outdoor Support Area
- Laboratory / Science
- Laboratory Support
- Laboratory Logistics
- High Bay
- Workshops
- Neighbourhood
- Scaled
- Not Scaled
- Security Point
- Public Spaces
- Client Shared Spaces
- Private Spaces
- SOA Support
- SOA Workpoints
- Admin Support
- Admin / Workpoints
- Admin Special Purpose Space (SPS)
- Building Ops and Maintenance
- Direct Adjacency
- Secondary Adjacency
- Tertiary Adjacency
- Close Proximity
- Exterior Access
- View
- View Outdoors



TSTS ADJACENCY DIAGRAM

SCIENCE DIAGRAM
SCIENCE NEIGHBOURHOOD - SPACES
(v.2)

LEGEND

- Outdoor Support Area
- Laboratory / Science
- Laboratory Support
- Laboratory Logistics
- High Bay
- Workshops
- Neighbourhood
- Scaled
- Not Scaled
- Security Point
- Public Spaces
- Client Shared Spaces
- Private Spaces
- SOA Support
- SOA Workpoints
- Admin Support
- Admin / Workpoints
- Admin Special Purpose Space (SPS)
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- Secondary Adjacency
- Tertiary Adjacency
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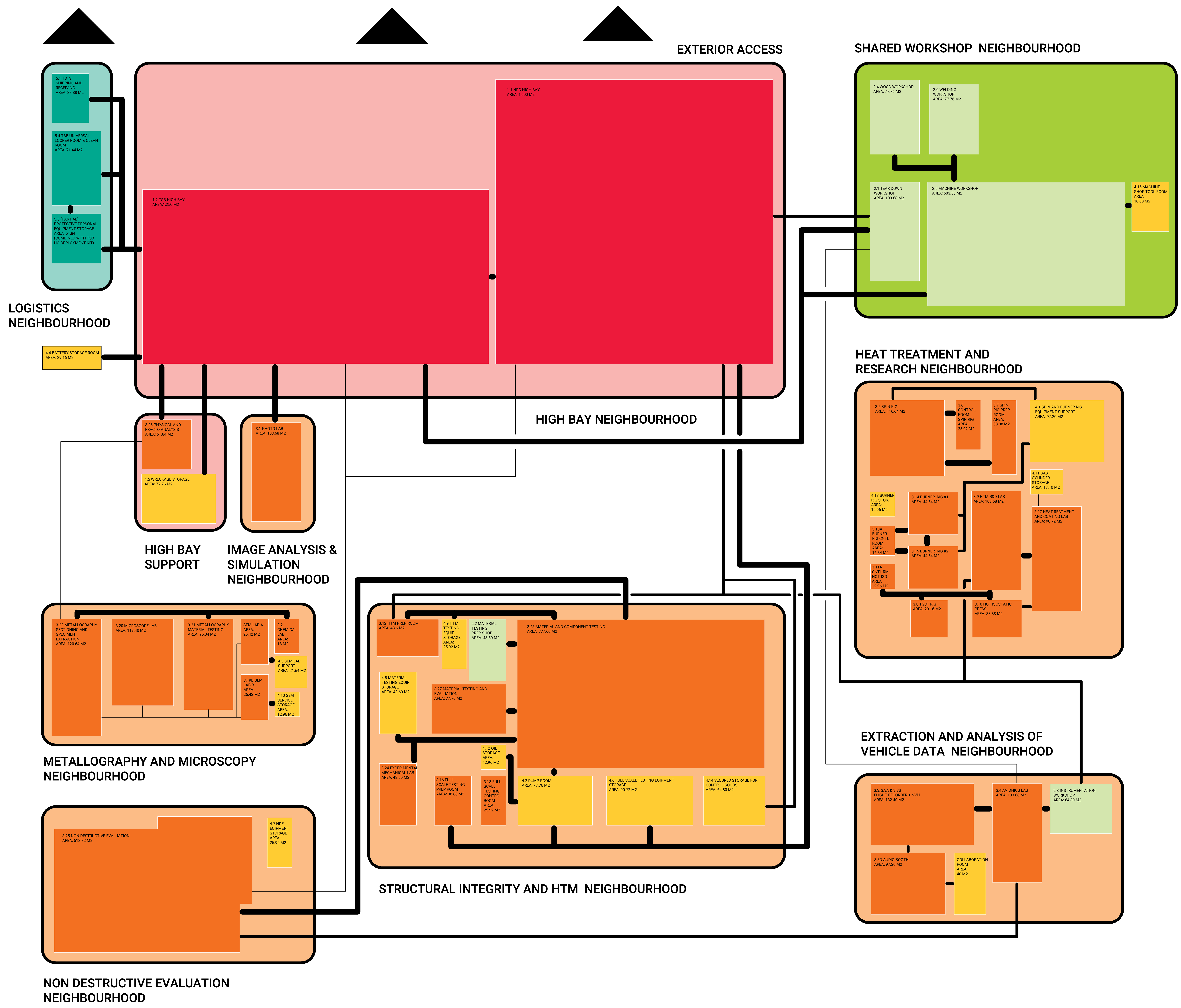

Appendix J THE LIFE CYCLE ASSESSMENT

FUNCTIONAL PROGRAMMING - LIFE CYCLE ASSESSMENT REPORT (100%)

TA 2.4.2

May 21, 2021

Prepared for:

Laboratories Canada
Public Services and Procurement Canada / Government of Canada

Prepared by:

FRAMEWORK

FINAL

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LIST OF FIGURES

Executive Summary

A Life Cycle Assessment (LCA) was completed for the Transportation Safety and Technology Science (TSTS) Hub to quantify the embodied carbon, or carbon footprint, of the structure. Together with the operational carbon analysis, the LCA enables a greater understanding of the carbon drivers within the facility. The functional programming LCA focuses on structural components and the exterior envelope of the building. Without a completed design, several assumptions are made to determine the structural quantities for various portions of the facility. Special consideration is given to the office block, where steel, concrete, and mass timber are all considered as materials.

The results of the LCA, completed with the software One Click, indicate that a 950 tonne reduction in embodied carbon can be achieved by framing the office block superstructure with mass timber. If biogenic carbon, which can be thought of as a “negative emission” (since it refers to carbon that is stored in biological materials), is considered, the reduction increases to 1,540 tonnes of embodied carbon for the mass timber option. The overall embodied carbon in the building is most significantly influenced by concrete (largely present in the substructure). While concrete will not be completely eliminated in the building, carefully specifying the material and its source can improve the building’s carbon footprint. Similar considerations can also be made for other building materials.

The overall embodied carbon results are also compared against other facilities in the Embodied Carbon Benchmark Study, and findings show that the early stage embodied carbon results are below the average for offices, mixed-use, warehouses, and industrial facilities. As the building design progresses, additional life cycle assessments should be completed. As the inputs improve in accuracy, the results will also improve, and lead to more accurate insights into the building and areas for improvement.

1.0 LIFE CYCLE ASSESSMENT

1.1 INTRODUCTION

Globally, the building sector, materials and operations, account for over 33% of the annual emissions of greenhouse gases (GHGs), with building materials alone contributing 11% (IEA, 2019). The building industry is one that is constantly changing and evolving, from advancing different technologies and materials to adopting new design processes. Now, the building construction industry is shifting to help aid Canada's efforts in reducing its carbon emissions and mitigating the evermore challenging effects of climate change.

A Life Cycle Assessment (LCA) is a method used to quantify the embodied carbon for any given product, building, or service. The term embodied carbon refers to the carbon footprint of a building material; it considers all emissions associated with the manufacturing, transport, installation, use, and end of life of the material. An LCA can be initiated at any stage of the project timeline and is largely based on being able to quantify the amount of all the materials to be used. Additional parameters, such as construction site operations, energy, and water consumption can impact the outcome. The results from an LCA are typically expressed as a total embodied carbon value, t CO_2e, or as a unitary value per building area, kg CO_2e/m^2.

This report contains results of a preliminary LCA performed for the Transportation Safety and Technology Science (TSTS) Hub. It describes objectives and strategies of the LCA study, outlines the methodologies used to conduct the assessment, and summarizes the inherent limitations of the report. It also discusses the major structural and architectural design assumptions that were made in order to estimate the total construction materials, which are the key inputs into the LCA. The report then presents the final embodied carbon results and provides a discussion into key carbon drivers and how they can be reduced, as well as comments on the results relative to the industry benchmark.

This LCA is based on the gross floor area and massing from the 66% functional programming report along with the associated massing model dated December 16, 2020. The changes made to the gross floor area from the 66% to the final functional programming report do not affect the results presented, as the embodied carbon values are expressed per unit floor area. The subsequent discussions and recommendations made also all remain valid.

1.2 BUILDING DESCRIPTION

Location: Ottawa, ON

Gross Building Area: approx. 22,500 m^2

The TSTS Hub is primarily a single-story structure consisting of the following key spaces: High Bay, Laboratory, Laboratory Support, Logistic Support, Workshops, Public Realm, and Offices. To facilitate the LCA, the key spaces were further grouped by similar structural systems, generalized as the high bay (which includes the two high bay laboratories), mid bay (which includes all science spaces with a building height of 7 m), and normal bay (which contains the remaining science spaces with a building height of 5 m or less). Lastly, the office space, which contains the offices and public realm.

Table 1-1: Gross Floor Area Summary

Space Name	Group	Gross Floor Area (m^2)
High Bay	High Bay	3562
Laboratory	Mid Bay	5958
Laboratory Support (H = 7 m)	Mid Bay	
Workshops	Mid Bay	
Laboratory Support (H < 7 m)	Normal Bay	3859
Logistic Support	Normal Bay	
Public Realm	Office Space	9198
Offices		

Section 4 of the functional programming report contains further details of the space breakdown and description. **Appendix F** can be referenced for the area tabulation of the non-science spaces, **Appendix G** can be referenced for the area tabulation of the science spaces, and **Appendix I** can be referenced for the adjacency diagrams.

For more information on the structural considerations, **Section 10.1** of the functional programming report can be referenced, which contains the preliminary structural engineering recommendations for the entire building. It is noted that much of the structure is governed by the functional requirements. In the high bay spaces, the structural roof framing will consist of a metal roof deck supported on long-span steel joists, roof, and perimeter columns. Crane girders will also be supported off of the perimeter columns. No interior columns are permitted due to the presence of the overhead cranes. For spaces in the mid bay with overhead cranes, a similar steel roof framing has been assumed. Throughout the remaining spaces in the mid and normal bay, the structural framing will be a conventional metal roof deck supported on steel framing of joists, girders, and columns. For the office space, conventional office structural systems utilizing steel, concrete, mass timber, or a hybrid may be used.

The substructure of the TSTS Hub will likely be constructed using cast-in-place concrete foundations supported on strip and square footings and a reinforced concrete slab on grade. A geotechnical assessment will be completed for the site and the optimal foundation system will be developed in conjunction with the geotechnical engineer.

2.0 OBJECTIVES AND STRATEGIES

2.1 LCA OBJECTIVES

This preliminary LCA report serves a range of purposes:

- To calculate material impacts and understand key embodied carbon drivers early on.
- To ensure the most efficient and effective use of material, resources, and knowledge of best practices.
- To identify potential strategies for reduction or substitution in the identified areas of concern.
- To assess how the TSTS Hub compares to buildings of a similar typology, function and/or size (i.e., benchmarking to existing industry data).

2.2 MATERIAL SELECTION CONSIDERATIONS

Mass timber: as floors typically represent the highest amount of embodied carbon in a conventional steel or concrete building, the use of mass timber to frame the office space will be explored and compared against conventional steel framing. In general, the steel deck will be substituted by a cross-laminated timber (CLT) deck, and the steel joists, girders and columns will be substituted by glued-laminated (glulam) members. The results from both options will be compared to determine whether the carbon impact is significant.

Structural steel: structural steel is known for its high recycled content, approximately 93% (AISC, 2017), and has one of the highest recycling rates of any construction material. As such, preference for locally sourced materials with a high recycled content will be given. The table below lists the assumed percentages used for the LCA.

Table 2-1: Percentage Recycled Contents

Component	% Recycled Content
Structural steel	93
Reinforcement steel (rebar)	97
Sheet metals	30 (CSSBI, 2012)

Concrete: it is also a known fact that concrete is one of the main contributors to the carbon footprint of most buildings and infrastructure assets, with cement being the main driver. Given that concrete will be the primary building material for the building's foundation system, preference will be made for ready-mix concrete to include high Supplementary Cementing Materials (SCMs), to offset some of the cement content. While the SCM quantities may vary for different mixes used in the building structure, for this report, a 25% fly ash mix will be assumed.

Others: Enclosures can represent up to 15% of the global warming impact of a typical office building (Melton, 2018). Although this statistic varies by building type, it is important to recognize this potential impact. As a preliminary baseline, a highly insulated building envelope has been selected.

3.0 METHODOLOGY

3.1 LIFE CYCLE ASSESSMENT SCOPE

Referencing the guidelines by the Canada Green Building Council in their Embodied Carbon Reporting Template (CaGBC, 2020), the following structural and envelope components for the building were included:

- Footings, piers, and slab on grade
- Structural wall assemblies (exterior walls only)
- Structural floors and ceilings (no finishes)
- Roof assemblies

Primarily, the focus is on the structure and envelope components, which is an appropriate level of detail for projects in the functional programming design stage. Using the preliminary project massing model dated December 16, 2020 and the information outlined in **Section 10.1** and the Room Data Sheets, a preliminary structural framing was established for the entire structure. To establish the structural components (the super and sub structure), additional design assumptions were made. With a preliminary structural framing and architectural build-ups established, a quantity-take off for all the construction materials was then conducted. Using the software One Click LCA, an analysis for the embodied carbon of the building was performed based on the materials from the quantity take-off.

3.2 REPORT LIMITATIONS

The results of an LCA are heavily reliant on the input parameters, particularly the construction material quantities. Given the preliminary phase of the project, changes are anticipated moving forward. Any changes that affect the building size and final heights will affect the final material quantities, and thus the final embodied carbon values. In addition, with most of the structure governed by the functional requirements, any new changes to parameters such as loading, space constraints can also significantly change the structural framing and thus the total material quantity. The LCA only contains the structural and envelope components, meaning other parameters such as external area, site elements, and building technology are not considered.

The software One Click also "maps" the input materials to its own internal database of materials. For example, if the user inputs 10,000 m^3 of 25MPa ready-mix concrete, One Click will give the user the option to choose from local generic data or manufacturer specific data for the concrete material. Manufacturer specific data is often not available for products manufactured within Canada or North America, so local generic data is typically selected. Given the lack of specificity, it is anticipated that the carbon results may change depending on the material mapped. However, given the overall level of detail, this variance is not significant and will produce useful results at the preliminary stage. Lastly, the analysis conducted using OneClick also does not consider construction site operations and water. Refer to the preliminary energy modelling report for details on operating energy and carbon emission estimates.

4.0 DESIGN ASSUMPTIONS

4.1 STRUCTURAL DESIGN ASSUMPTIONS

The following sections describe the structural design assumptions made for the super and substructure. For the purposes of this report, the key spaces were categorized into high bay, mid bay, normal bay, and offices. Each subsection contains a brief introduction of the framing assumptions and any unique room characteristics (such as overhead cranes). A table summarizing the total material quantity for individual component is then presented. All material quantity values are expressed in units per floor area. To determine the total material quantity for a given area/room, multiply by the gross floor area stated above each table. For example, in the high bay, the total weight of steel deck will be 14 kg/m^2 x 2000 m^2 = 28,000 kg.

4.1.1 HIGH BAY

The high bay zone consists of one high bay laboratory for the National Research Council of Canada's (NRC) Structures and Materials Performance Laboratory (SMPL) and the Transportation Safety Board of Canada's (TSB) Engineering Lab. The NRC high bay will be 20 m tall, single story research facility, housing a 10 t overhead crane spanning 40 m. Similarly, the TSB Engineering Lab will be an investigative facility with two 20 t overhead cranes spanning 25 m.

Table 4-1: NRC High Bay Structural Quantities (Gross Floor Area: 2000 m2)

Component	Details	Quantity (kg/m^2 floor area)
Roof Deck	76 mm steel deck	14
Roof Framing	2600 mm open web steel joist	29
	W610 steel roof girder	5
Crane Girder	W610 steel	6
Column	W360 steel	59
Lateral System	HSS305x305 diagonal steel bracing	5.5
Miscellaneous[1]	Steel channels, angles, HSS	3
Connections[2]	Steel connections	16.5
Slab on Grade	1800 mm thick concrete	Concrete: 4140 Reinforcing steel: 810
Apron Slab	300 mm thick concrete, 8 m wide	Concrete: 690 Reinforcing steel: 30
Foundations	5500 x 5500 x 500 mm concrete spread footing including piers	Concrete: 410 Reinforcing steel: 18

Table 4-2: TSB High Bay Structural Quantities (Gross Floor Area: 1562 m2)

Component	Details	Quantity (kg/m2 floor area)
Roof Deck	76 mm steel deck	14
Roof Framing	2000 mm open web steel joist	20
	W530 steel roof girder	6.5
Crane Girder	W610 steel	9
Column	W360 steel	75
Lateral System	HSS254X254 diagonal steel bracing	5
Miscellaneous	Steel channels, angles, HSS, beams	3
Connections	Steel connections	17
Slab on Grade	300 mm thick concrete	Concrete: 690 Reinforcing steel: 22
Foundations	4000 x 4000x 500 mm concrete spread footing including piers	Concrete: 285 Reinforcing steel: 12.5

1 Framing for mechanical and electrical components, cladding support, roof and wall openings, etc.
2 Calculated as 15% of the total steel weight of joist, roof and crane girder, column, lateral system and miscellaneous

4.1.2 MID BAY

The mid bay refers to the laboratory, laboratory support, and workshop spaces with a building height of 7 m. Within the mid bay there are a couple unique spaces, the Material and Component Testing room features a 10 t overhead crane spanning 22 m. In the workshop space, the Machine Workshop room houses a 2 t overhead crane spanning 18 m. For the remaining spaces in the mid bay, the framing is assumed to be a 7.2 m x 7.2 m bay framed with steel joists, girders, and columns. The 7.2 m bay was selected to fit the typical 3.6 m lab module.

Table 4-3: Material and Component Testing Structural Quantities (Gross Floor Area: 1438 m2)

Component	Details	Quantity (kg/m^2 floor area)
Roof Deck	76 mm steel deck	14
Roof Framing	1800 mm open web steel joist	18.5
	W460 steel roof girder	7.5
Crane Girder	W610 steel	9.5
Column	W360 steel	20.5
Miscellaneous[1]	Steel channels, angles, HSS	2.5
Connections[2]	Steel connections	9
Slab on Grade	500 mm thick concrete	Concrete: 1150 Reinforcing steel: 30
Foundations	2500 x 2500 x 300 mm concrete spread footing including piers	Concrete: 95 Reinforcing steel: 5

Table 4-4: Machine Workshop Structural Quantities (Gross Floor Area: 900 m2)

Component	Details	Quantity (kg/m^2 floor area)
Roof Deck	76 mm steel deck	14
Roof Framing	1600 mm open web steel joist	16
	W530 steel roof girder	9
Crane Girder	W610 steel	17.5
Column	W360 steel	23
Miscellaneous[1]	Steel channels, angles, HSS	2.5
Connections[2]	Steel connections	10
Slab on Grade	300 mm thick concrete	Concrete: 690 Reinforcing steel: 18
Foundations	2500 x 2500 x 300 mm concrete spread footing including piers	Concrete: 115 Reinforcing steel: 5

Table 4-5: Typical Mid Bay Structural Quantities (Gross Floor Area: 3620 m2)

Component	Details	Quantity (kg/m^2 floor area)
Roof Deck	76 mm steel deck	14
Roof Framing	650 mm open web steel joist	5
	W460 steel roof girder	17
Column	W250 steel	6.5
Lateral System	HSS152X152	1.5
Miscellaneous[1]	Steel channels, angles, HSS	2
Connections[2]	Steel connections	5
Slab on Grade	150 mm thick concrete	Concrete: 344 Reinforcing steel: 9
Foundations	2000 x 2000 x 300 mm concrete spread footing including piers	Concrete: 66 Reinforcing steel: 3

4.1.3 NORMAL BAY

The normal bay contains the remaining science (non-office) spaces with a building height of 5 m or less. Like the typical mid bay spaces, the roof framing for the normal bay is also assumed to be a 7.2 m x 7.2 m bay with steel joists, girders, and columns.

Table 4-6: Typical Normal Bay Structural Quantities (Gross Floor Area: 3859 m2)

Component	Details	Quantity (kg/m^2 floor area)
Roof Deck	76 mm steel deck	14
Roof Framing	650 mm open web steel joist	5
	W460 steel roof girder	17
Column	W250 steel	5
Lateral System	HSS152X152 steel diagonal bracing	1.5
Miscellaneous[1]	Steel channels, angles, HSS, beams	2
Connections[2]	15% of steel framing	5
Slab on Grade	150 mm thick concrete	Concrete: 344 Reinforcing steel: 9
Foundations	2000 x 2000 x 300 mm concrete spread footing including piers	Concrete: 66 Reinforcing steel: 3

4.1.4 OFFICE SPACE

In the office space, the floor and roof framing will consider three framing options: conventional structural steel, fully mass timber, and a hybrid steel and mass timber framing.

4.1.4.1 OPTION 1 – CONVENTIONAL STEEL FRAMING

Option 1 considers framing the entire three-story office structure using conventional structural steel. The structural framing for the roof and floors will be a conventional metal roof deck supported on steel framing of joists, girders, and columns- very similar to the typical spaces in the mid and normal bays. For both steel and timber framing options, the typical roof and floor grid is assumed to be a 6 m x 6 m bay. The substructure (namely the slab on grade and foundations) for all three options is identical.

Table 4-7: Typical Steel Office Structural Quantities (Gross Floor Area: 9198 m2)

Component	Details	Quantity (kg/m^2 floor area)
Roof Deck	76 mm steel deck	14
Roof Framing	550 mm open web steel joist	5
	W410 steel	20.5
Floor Deck	115 mm concrete on 38 mm steel deck	Concrete: 216 Steel deck:10
Floor Framing	550 mm open web steel joist	6.5
	W410 steel	22.5
Column	W360 steel	25.5
Lateral System	HSS152X152 steel diagonal bracing	0.75
Miscellaneous[1]	Steel channels, angles, HSS, beams	2
Connections[2]	Steel connections	12
Foundations	3500 x 3500 x 300 mm concrete spread footing including piers	Concrete: 178 Reinforcing steel: 8

4.1.4.2 OPTION 2 – FULLY MASS TIMBER FRAMING

Option 2 considers framing the entire three-story office structure using mass timber. The framing concept is identical to conventional steel framing, with the exception of the material choice. The steel deck will be substituted by a cross-laminated timber (CLT) deck, and the girders and columns will be substituted by glued-laminated (glulam) members. It is of note that a fully mass timber framing is not entirely steel free- some structural steel is still assumed for connections, lateral bracing, and other miscellaneous items.

Table 4-8: Typical Mass Timber Office Structural Quantities (Gross Floor Area: 9198 m2)

Component	Details	Quantity (kg/m^2 floor area)
Roof Deck	175 mm CLT	98
Floor Deck	175 mm CLT	98
	50 mm lightweight concrete topping	140
Roof Framing	241 x 495 mm glulam girder	21.5
Floor Framing	241 x 546 mm glulam girder	24
Column	241 x 241 mm glulam column	3
Lateral System	HSS152X152 steel diagonal bracing	0.75
Miscellaneous[1]	Steel channels, angles, HSS, beams	2
Connections[3]	Steel connections	12
Slab on Grade	150 mm slab on grade	Concrete: 345 Reinforcing steel: 9
Foundations	3500 x 3500 x 300 mm concrete spread footing	Concrete: 178 Reinforcing steel: 8

4.1.4.3 OPTION 3 – HYBRID STEEL AND TIMBER FRAMING

Option 3 assumes only the public realm and lobby/circulation spaces are framed using mass timber, and the remaining office spaces with conventional structural steel. Currently, the public realm and all related circulation spaces are located on the first floor only. Structurally, this translates to framing only a portion of the first-floor columns and second story floor using timber. Refer to the quantity tables presented in Option 1 and 2 for the quantities and the following floor areas for steel and timber.

Conventional Steel Gross Floor Area: 8424 m^2

Mass Timber Gross Floor Area: 774 m^2 (on first floor)

4.1.5 ADDITIONAL STRUCTURAL ASSUMPTIONS

4.1.5.1 PERIMETER ASSUMPTIONS

Perimeter foundation wall and strip footing was not captured in previous tables and are presented below.

Table 4-9: Additional Perimeter Structural Assumptions (Gross First Floor Area: 16,416 m2)

Component	Detail	Quantity (kg/m^2 floor area)
Foundations	400 mm thick concrete perimeter foundation wall and 1100 mm wide concrete strip footing	Concrete: 44 Reinforcing steel: 4

[3] Connections between timber members will be in steel; bolts, fasteners, knife plates etc. Quantity is assumed to be the same as the conventional steel option connections.

4.2 ARCHITECTURAL ASSUMPTIONS

The following architectural assumptions were made for the building envelope components.

4.2.1 EXTERIOR WALL

Table 4-10: Wall Assembly Assumptions (Gross Surface Area: 7,091 m2)

Component	Detail	Quantity (m^2)
Exterior Wall	Metal cladding	4,756
	175 mm semi rigid insulation (R25)	4,756
	250 mm masonry block wall	4,756
	Double pane windows[4]	2,235

4.2.2 ROOF

Table 4-11: Roof Assembly Assumptions (Gross Roof Area: 16,416 m2)

Component	Detail	Quantity (m^2)
Roofing	2 ply modified SBS bitumen membrane	16,416
	250 mm polyiso (R50)	16,416

5.0 EMBODIED CARBON RESULTS

With the incorporation of mass timber framing elements in options 2 and 3, biogenic carbon can play a role in determining the total embodied carbon for the building. Biogenic refers to the carbon that is stored in biological materials such as plants and soil. Within a building context, biogenic carbon can be treated as a "negative emission", meaning it can be deducted from the total carbon emissions. Only 2 specific tools within One Click have the option of including the biogenic carbon in the detailed results output, with most of the tools (such as the one used for this study) only treating biogenic carbon as additional information. This means the negative emissions are not included in the final results within the detailed figure results presented. **Section 5.4** discusses the biogenic carbon results separately and manually includes them in the total carbon emission values.

[4] 20% glazing area for high bay, 30% glazing area for mid and normal bay, 60% glazing area for offices

5.1 OPTION 1 – CONVENTIONAL STEEL FRAMING

The analysis for the structure and enclosure results in a total embodied carbon of **8,494 t CO_2e** and a unitary embodied carbon of 380 CO_2e kg /m².

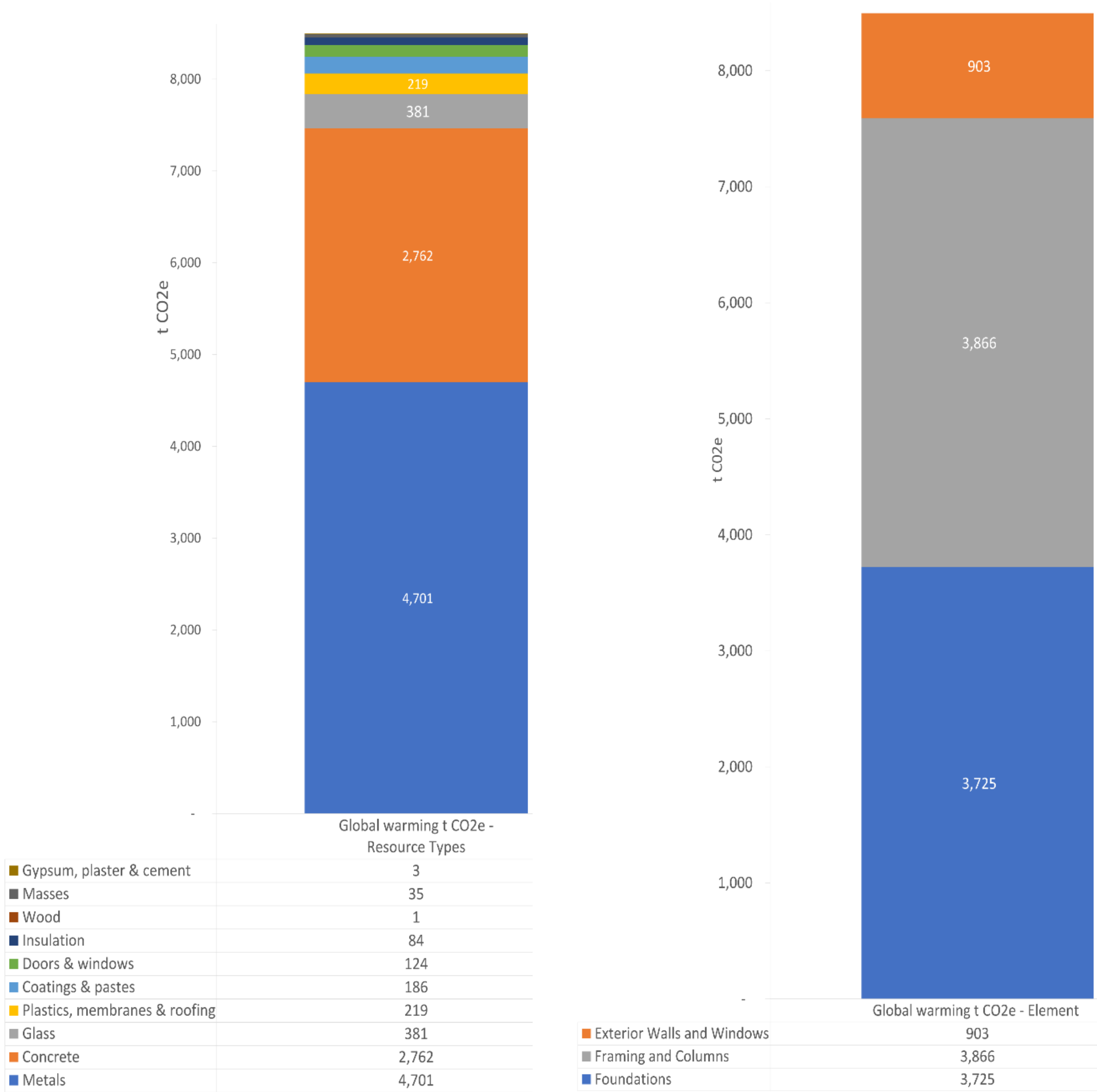
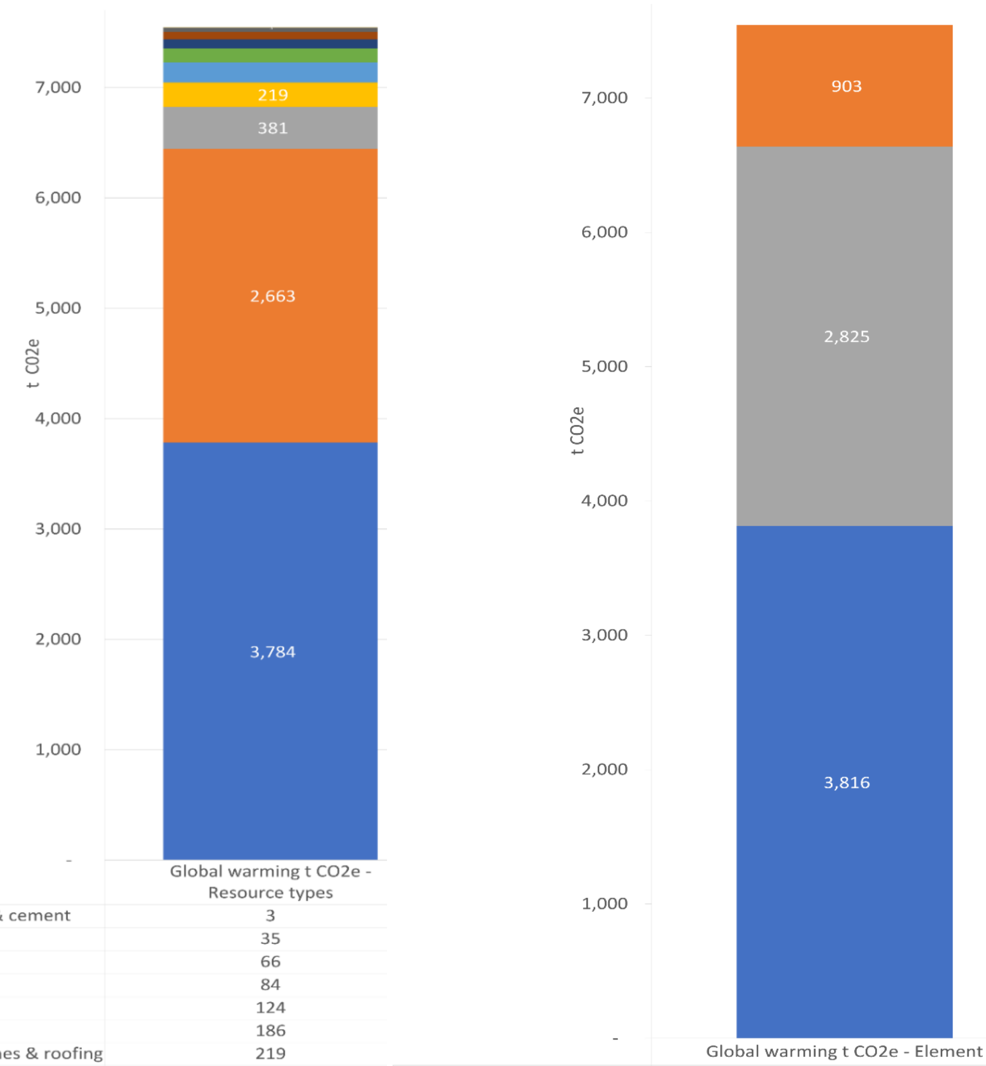


Figure 5-1: Option 1 Embodied Carbon Results

5.2 OPTION 2 – FULLY MASS TIMBER FRAMING

By switching to fully mass timber framing for the office space, the mass timber floor area is now approximately 40% of the total building gross area (9198 m^2 out of 22,500 m^2).

By comparison, the analysis results for option 2 show a total embodied carbon of **7,544 t CO_2e** and a unitary embodied carbon of 328 CO_2e kg /m^2. In comparison to option 1, this is 950 t reduction, roughly 11%.



	Global warming t CO2e - Resource types
Gypsum, plaster & cement	3
Masses	35
Wood	66
Insulation	84
Doors & windows	124
Coatings & pastes	186
Plastics, membranes & roofing	219
Glass	381
Concrete	2,663
Metals	3,784

	Global warming t CO2e - Element
Exterior Walls and Windows	903
Framing and Columns	2,825
Foundations	3,816

Figure 5-2: Option 2 Embodied Carbon Results

5.3 OPTION 3 – HYBRID STEEL AND TIMBER FRAMING

For option 3, the mass timber floor area is approximately 3.5% of the total building gross area and 8.5% out of the office space (774 m^2 out of 22,500 m^2 and 9,198 m^2).

The analysis results show a total embodied carbon of **8,402 t CO_2e** and a unitary embodied carbon of 376 CO_2e kg /m^2.

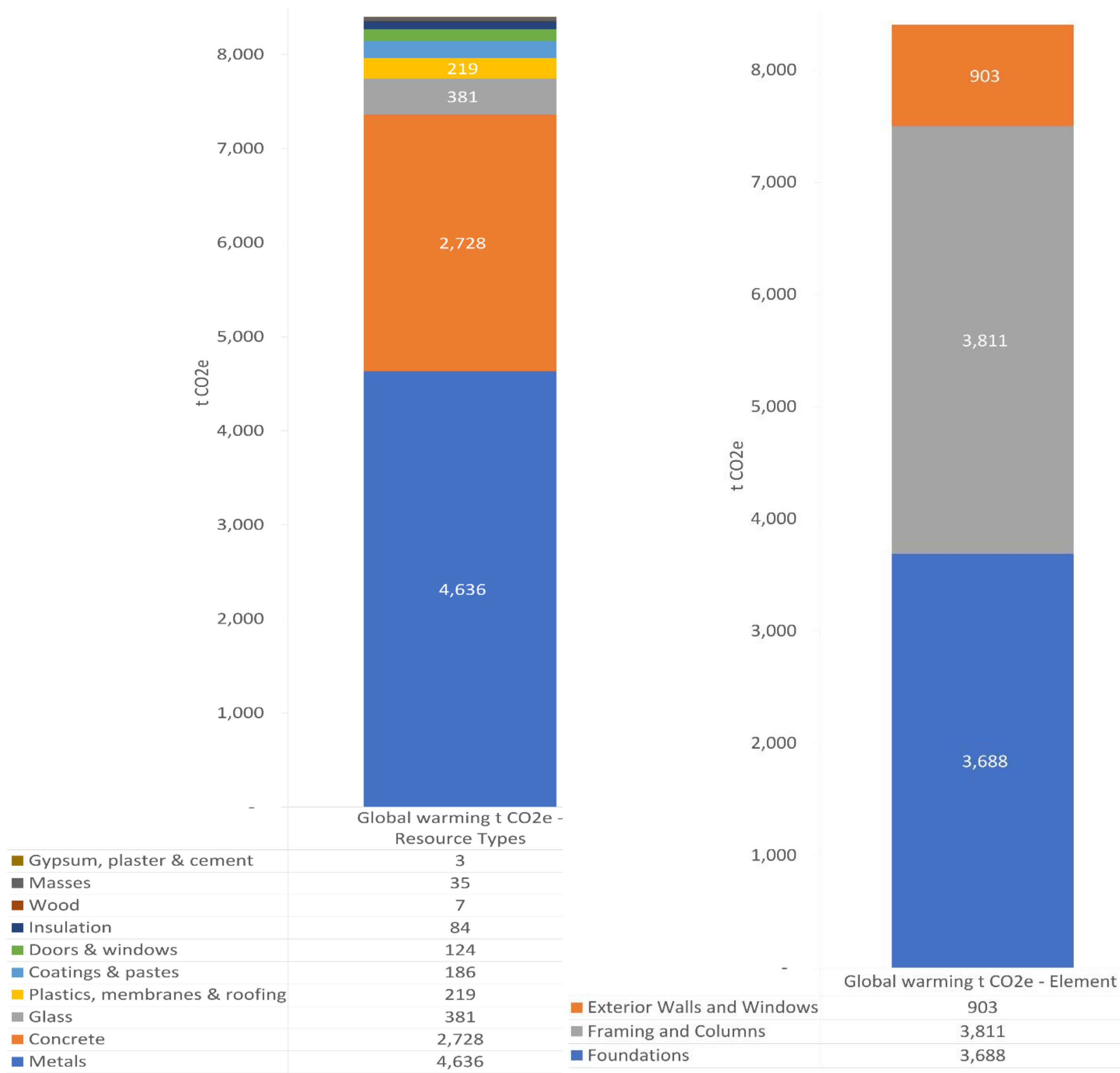


Figure 5-3: Option 3: Embodied Carbon Results

The hybrid framing option offers only a 92 t carbon reduction when compared to the fully steel framing, but a 858 t increase when compared to the fully timber framing.

A clear common trend between all three options is that by resource type, metals and concrete lead to most of the carbon output, which is to be expected given that they form the majority of the sub and superstructure. The results, if grouped by element type, also align with this expectation.

5.4 BIOGENIC CARBON RESULTS

OneClick has the ability to calculate biogenic carbon following the British Standard EN 16449:2014 Wood and Wood-based Products:

Table 5-1: Biogenic Carbon Results

Framing Option	Biogenic Carbon Storage (t CO_2e)
Conventional Steel	30
Hybrid Steel and Timber	90
Fully Mass Timber	620

It is noted the biogenic carbon values were not yet included in the total carbon emission values that was listed in the previous sections. As a summary, the initial emission values were:

Timber Framing		Hybrid Framing		Steel Framing
7,544 t CO_2e		8,402 CO_2e		8,494 t CO_2e
	+ 858 t CO_2e		+ 92 t CO_2e	

As expected, the hybrid framing results were quite similar to the fully steel framing. Now, with the negative emissions from the biogenic carbon now subtracted out, the final values are as follows:

Timber Framing		Hybrid Framing		Steel Framing
6,924 t CO_2e		8,312 t CO_2e		8,464 t CO_2e
	+ 1,388 t CO_2e		+ 152 t CO_2e	

The results show an even more drastic change. When considering the effects of biogenic carbon, between the two extreme framing options, roughly 18% of the total carbon emissions from the steel option can be avoided with the fully timber framing compared to the previous 11%.

5.5 KEY DRIVERS AND RECOMMENDATIONS

5.5.1 CONCRETE

The results from the analysis showed that for both options, concrete contributes the greatest amount of embodied carbon. Concrete is the main building material for virtually all foundations and ground slabs in general and cannot be substituted with a different material. However, improvements can be made during the design stage, with a focus on research into greener concrete mixture solutions. Looking into alternative supplementary materials, such as ground granulated blast furnace slag (GGBFS) and silica fume may provide new insights. In addition, determining the maximum percentage of SCMs before tradeoffs such as reduction of early strength and sensitivity to curing and finishing procedures is also important. Investigation into what mix alternatives are locally and readily available is also warranted. A better understanding the limitations and backgrounds of these greener mix alternatives will help to grow the list of viable alternatives as the building design progresses.

5.5.2 STRUCTURAL STEEL

Metals, essentially structural steel, was the second key contributor to the building's carbon emissions. To add, structural steel is already a highly recycled material, being over 93% of recycled content. Thus, the strategy here can be to focus on operational carbon, which can help to offset some these seemingly irrevocable carbon emissions.

5.5.3 MASS TIMBER

The incorporation of mass timber framing provides a significant reduction to the total carbon emissions, especially if the entirety of the office space is framed in timber. The hybrid option, which considers only framing the public realm in timber, does not yield a major increase in timber quantities to reap the benefits of the material.

For 2021, the carbon pollution price is $40 per tonne and set to increase by $10 per tonne per year (Government of Canada, 2019), making the cost of carbon pollution a compounding problem. This report considers 2 options for incorporating timber into the building structure. More options can also be explored with the goal to find the optimal amount of timber framing, that maximizes carbon reductions.

5.5.4 BIOGENIC CARBON

Biogenic carbon has been calculated for the timber framing members in this analysis. However, biogenic carbon that is stored in biological materials such as plants, can also be assessed at the next/future stage of the project. Bio-based materials, such as those found on a green roof, can contribute towards a reduction in the overall carbon emissions. As previously stated, for the purposes of this preliminary analysis, these parameters were omitted but as the project advances and more information is confirmed and known, it will be sensible to include some of these parameters. With a more accurate understanding of how the building operates on a day to day, a more complete picture of its carbon impact will be realized.

5.6 BENCHMARKING

The LCA for Low Carbon Construction is a project initiative that has compiled the largest database (over 1,000 building LCA studies) of building embodied carbon (The Carbon Leadership Forum, 2017). The database allows users to group the database results based on building parameters such as program type, building use, building location, number of stories above grade and floor area. The graph below displays the data filtered by program type. Given the unique building type of the TSTS Hub, the program types as categorized by the database do not exactly match the TSTS Hub. Thus, the box plots below were selected to show a variety of program types that the TSTS Hub has similar features to, with the intention of providing a range of results instead. The red box represents the interquartile range, with the median and upper and lower quartile values indicated. A blue horizontal line, at 361 CO_2e kg /m^2, to present the unitary average of the three options (380, 328, and 376), has been included as a reference to the average unitary value obtained for the TSTS Hub.

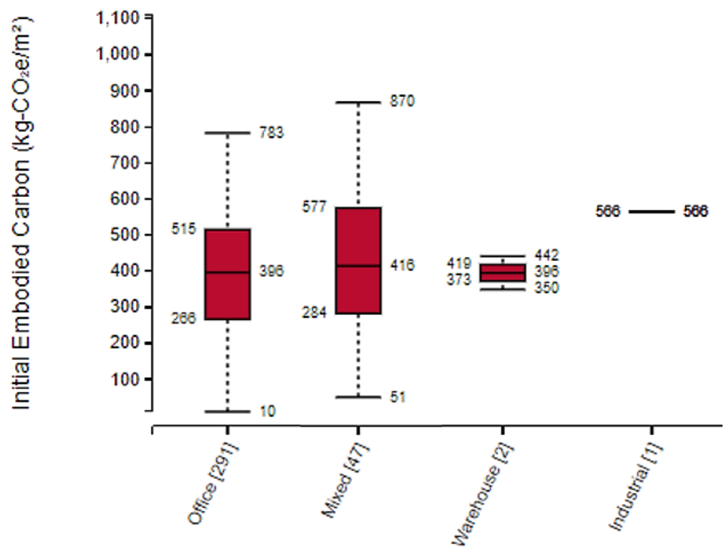


Figure 5-4: Embodied Carbon Benchmark Study, by Program Type

Similarly, the data range for buildings of a similar floor area (given in m²) and located in North America are presented below.

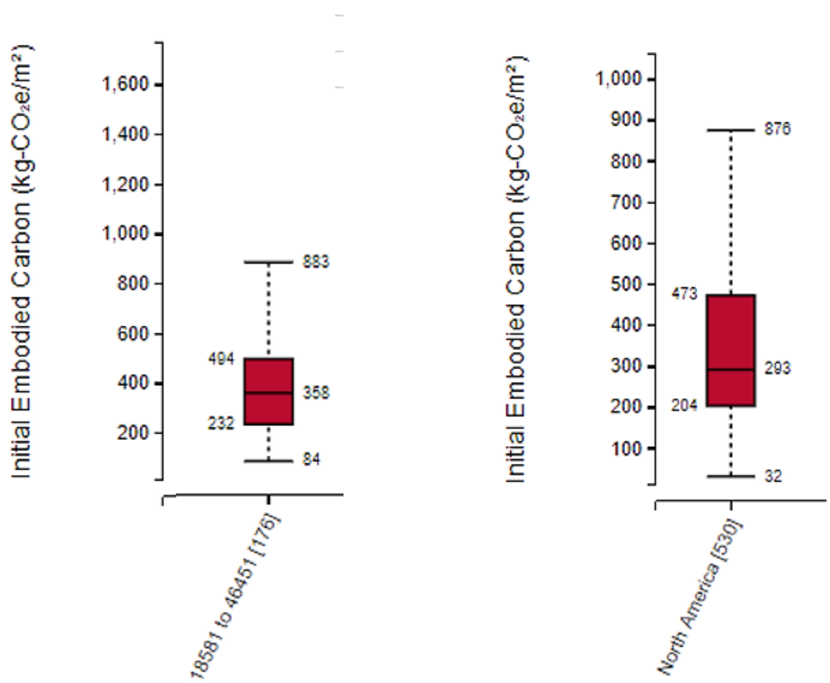


Figure 5-5: Embodied Carbon Benchmark Study, by Floor Area (m2) and Location

Reviewing the unitary carbon results (expressed as CO_2e kg /m^2) for the three options, the TSTS Hub is generally slightly below average when judging on the basis of program type, and generally right on average when comparing floor area. Relative to buildings located in North America, the results show to be above average values.

Furthermore, the ILFI's Zero Carbon Certification allows a maximum of 500 kg CO_2e/m^2 embodied carbon for a project. This threshold is for LCA of projects that include foundation, structure, enclosure, finishes and partitions, which is a slightly bigger scope than the current study, which focusses on the foundation, structure, and enclosure only. In particular, the fully steel and hybrid framing options, both at approximately 380 kg CO_2e/m^2 is nearly 76% to the threshold at this preliminary stage. This further highlights the importance of the recommendations discussed previously, in order to try to control and reduce the carbon emissions that are likely to increase as the LCA progresses to include more components.

5.7 NEXT STEPS

Overall, the early stage embodied carbon results for the TSTS Hub are reasonable and fall within the expected range of values for buildings with similar characteristics. As the project advances further through Schematic Design and Detailed Design, it is crucial that the LCA is updated in parallel to the match the design progress. For example, at the next stages the LCA will be updated to include all building components, such as interior walls (partitions), doors, stairs, and exterior areas. Additionally, detailed research into materials and other components in the next design stages will allow the results from LCA to grow increasingly refined, accurate, and informative.

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Appendix K ENERGY MODELLING REPORT

FUNCTIONAL PROGRAMMING ENERGY MODELLING REPORT (100%)

TA 2.4.2

May 21, 2021

Prepared for:

Laboratories Canada
Public Services and Procurement Canada / Government of Canada

Prepared by:

FRAMEWORK

FINAL

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1.0 PROJECT INTRODUCTION

Laboratories Canada and Public Services and Procurement Canada (PSPC) have set an ambitious agenda for environmental sustainability, consistent with the Government of Canada's policies for climate action and environmental preservation. It is proposed that the Transportation Safety and Technology Science (TSTS) Hub be designed such that it is consistent with, and emblematic of, the governmental policies which establish portfolio-wide approaches to sustainability. These include the Federal Sustainable Development Strategy (FSDS 2019-2021), Greening Government Strategy (2020), and accompanying Real Property Guidance (2019).

Laboratories Canada Design Principles – Sustainability

Efficient use of energy, water, and material to reduce the impacts on the environment through better siting, design, construction, operation, and maintenance throughout the building's life cycle.

Defining Characteristics:

1.0 Design for net-zero carbon and net-zero energy ready facilities

2.0 Provide climate-resiliency in facility lifecycle design

3.0 Meets specific health and wellness goals

4.0 Design for high performance operations

This energy modelling report has been written to specifically address defining characteristic 1.0 Design for net-zero carbon and net-zero energy ready facilities.

1.1 APPROACH TO BUILDING PERFORMANCE

Laboratories Canada has challenged the design team to produce a net-zero carbon or net-zero energy ready facility. Such a goal requires a specific approach to evaluate building performance. Generally, there are two approaches to analyzing building performance that are used in the industry:

A. Comparative analysis

Many building energy efficiency codes use this approach. It is characterized by comparing the proposed design to a code reference case, such as the National Energy Code for Buildings (NECB). One models the proposed design and generates a 'copy' (commonly called the 'reference' or 'baseline' building) which meets the minimum requirements of the code. Performance is measured relative to the code reference case and generally reported as a percentage improvement relative to code. Comparative analysis emphasizes differences between the design and the code reference case, thus energy uses that are common to the proposed design and reference building are less significant. Notably, this means that process-plug loads are less impactful.

B. Absolute analysis

An absolute performance-based analysis is required when evaluating Net-Zero Carbon or Net-Zero Energy Ready buildings. Absolute analysis focuses on estimating total energy use and operational carbon emissions, including a detailed accounting of all energy end-uses. For absolute analysis, accurately representing process and plug loads is important. For a net zero carbon building, this is compared to the renewable energy production on site. Performance may also be compared to appropriate benchmarks, by comparing the energy use intensity (EUI) among other key performance indicators.

In contrast to comparative analysis, this approach does not involve a Reference Building. Absolute analysis will not report percentage better than code, as the design is not being compared to a code.

Given the sustainability principles of Laboratories Canada, the building energy model has been prepared consistent with an absolute analysis approach. As part of the functional programming stage, significant effort was concentrated on estimating the science-based process loads based on input from the various user groups (i.e. the science capabilities) to yield a more complete estimate of the operating profile for carbon and energy use in the building. This is detailed further in **Section 4.0**.

2.0 BUILDING ENERGY MODELLING METHODOLOGY

Using the massing model developed during functional programming phase, a whole-building energy model was developed using IES-VE 2019 modelling software. Given that the project is still in the early stages of design, the energy model and its associated inputs and outputs should be considered preliminary in nature.

In general, parameters related to the performance of the base building systems (i.e. mechanical, electrical and building envelope) were determined through input from the design team, based on high-level design strategies that strive towards maximum carbon reduction. Inputs related to process load estimates were determined collaboratively with the science capabilities through a combination of pre-populated questionnaires and consultation during the functional programming workshops, as well as supplementary reference material such as the master equipment list and process-specific documentation provided by the user groups.

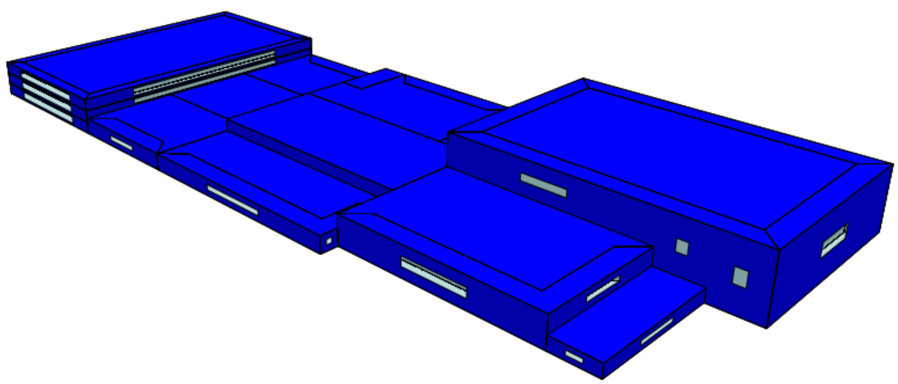


Figure 2.1: TSTS Hub - Preliminary Energy Model

The purpose of the preliminary energy model is to satisfy the following outcomes:

- Determine the performance potential and set preliminary targets for the TSTS Hub in relation to metrics for energy use and greenhouse gas emissions
- Provide a means to benchmark performance relative to other high-performance laboratories
- Identify the most significant drivers of energy use and key design parameters to optimize building performance
- Assess the viability of achieving Net-Zero Carbon and net Net-Zero Energy Ready

In addition to developing a base design model, a parametric modelling study was also carried out to the determine the impact of key design parameters on whole-building performance.

The analysis was facilitated using a custom parametric analysis data visualization tool developed by the Framework team to explore the impact and interrelationships between different design parameters. The tool was used in a live setting during Workshop #6 to communicate the impact of various measures to reduce energy and GHG emissions. The back-end analysis was performed using the EnergyPlus simulation engine via the Grasshopper and Honeybee interface to allow for iterative analysis of multiple design permutations. The parametric simulations were calibrated against the base design energy model developed in IES-VE to ensure consistency in results between the two energy modelling platforms.

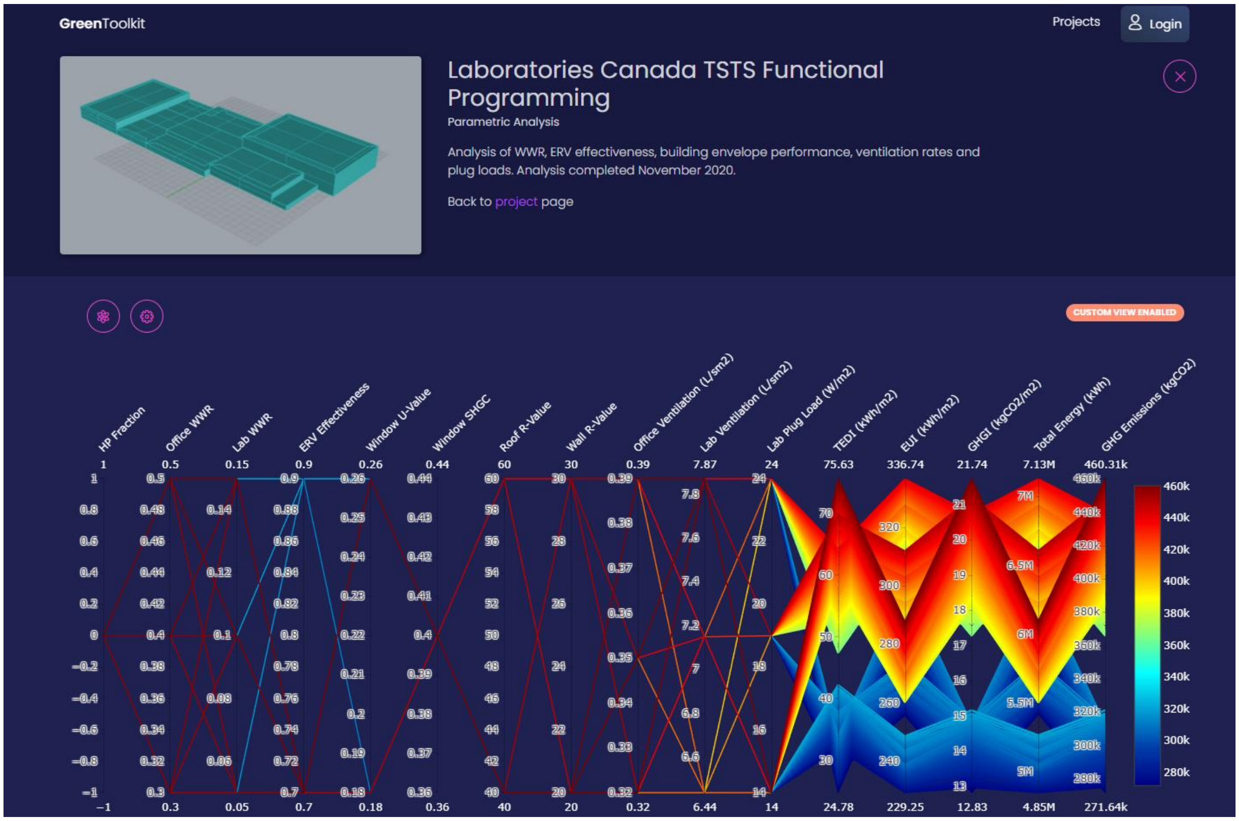


Figure 2.2: TSTS Hub - Parametric Energy Analysis Tool

The following variations in design options were explored as part of the parametric modelling study:

1. Office Window-to-Wall Ratio: 5%, 10%, 15%
2. Lab Window-to-Wall Ratio: 5%, 10%, 15%
3. Air-side Energy Recovery Effectiveness: 70%, 90%
4. Window U-value: 1.47 W/m^2.K, 1.02 W/m^2.K
5. Roof R-value: R-40, R-60
6. Wall R-value: R-20, R-30
7. Office Ventilation Rate: Base ventilation rate, 10% decrease, 20% decrease
8. Laboratory Ventilation Rate: Base ventilation rate, 10% decrease, 20% decrease
9. Lab Plug Load: Base load estimate, 25% increase, 25% decrease

The above options yielded a total of 3,880 discrete simulations with a range of output metrics including annual energy consumption, GHG emissions, energy use intensity (EUI), thermal energy demand intensity (TEDI), and a breakdown of energy consumption by end-use. Discussion of the results is provided in Section 5.5.

3.0 BUILDING ENERGY MODEL INPUTS

A building energy model has many inputs. A summary of key inputs related to the building systems is provided in the table below.

Table 3-1: Building Energy Model Inputs

Characteristic	Model Input
Operating Hours	**Office Space** Weekdays: NRC: On-site hours of operation are 8:00 a.m. to 5:00 p.m. TSB: Typically, 8:00 a.m. to 5:00 p.m. Weekends: Closed. Holidays: Closed. **Laboratory Space** Weekdays: NRC: On-site hours of operation are 8:00 a.m. to 5:00 p.m. TSB: Typically, 8:00 a.m. to 5:00 p.m. Weekends: Closed. Holidays: Closed.
Occupancy	Occupancy values follow the default NECB template values listed below per space type: • Loading: 50 m^2/person • Classroom/Lecture/Training: 2.86 m^2/person • Corridor/Transition: 100 m^2/person • Mechanical/Electrical: 200 m^2/person • Laboratory: 20 m2/person • Locker room: 5 m^2/person • Office: 20 m^2/person • Stairway: 200 m^2/person • Storage: 50 m^2/person • Washroom: 30 m^2/person • Workshop: 30 m^2/person
Plug loads	Unique laboratory process-plug loads will be modelled explicitly. Other spaces will follow the default NECB values listed below unless specified otherwise. • Loading: 5 W/m^2 • Classroom/Lecture/Training: 5 W/m^2 • Corridor/Transition: 0 W/m^2 • Mechanical/Electrical: 1 W/m^2 • Laboratory: 10 W/m^2 • Locker room: 2.5 W/m^2 • Office: 7.5 W/m^2 • Stairway: 0 W/m^2 • Storage: 1 W/m^2 • Washroom: 1 W/m^2

	• Workshop: 10 W/m^2 Additional specialty process-plug loads are included as documented in Section 4.0
IT Process loads	Server room 1 (200 W/m2) – 9m x 6m Server room 2 (200 W/m2) – 6m x 4m **Peak total modelled server room load: 15,600 W** 7 communication rooms (100 W/m2) – 4m x 3m **Peak total comm room load: 8,400 W**
Outdoor Air Volume	**Office Areas** ASHRAE 62.1, demand control ventilation **General Lab Areas, High and Mid Bay, and Workshop** Typical operation: 4 ACH during occupied hours, off during unoccupied hours. 10 ACH provided for certain laboratory areas: Extraction & Analysis of Vehicle Data, Metalography & Microscopy, Non-Destructive Evaluation, Structural Integrity and HTM.
Space Temperature Setpoints	**Office Areas** Heating • Occupied: 21°C +/- 1°C • Unoccupied: Temperature Setback Cooling • Occupied: 25°C +/- 1°C • Unoccupied: Temperature Setback **General Lab Areas** Heating • Occupied: 21°C +/- 1°C • Unoccupied: Temperature Setback permitted based on Lab function. Certain Lab(s) requires constant setpoint. Cooling • Occupied: 25°C +/- 1°C • Unoccupied Temperature Setback **High and Mid Bay Areas** Heating • Occupied: 21°C +/- 1°C • Unoccupied: Temperature Setback Cooling • Occupied: 25°C +/- 1°C (TSB High Bay), 23°C +/- 1°C (NRC High Bay) • Unoccupied: Temperature Setback **Workshop Areas** Heating • Occupied: 21°C +/- 1°C • Unoccupied: Temperature Setback Cooling • Occupied: 25°C +/- 1°C • Unoccupied: Temperature Setback Reference Room Data Sheets

Wall R-Value	R20 (Effective) Below Grade and R35 (Effective) Above Grade / OH Doors R17
Roof R-Value	R60 (Effective)
Window U-Value and SHGC	U-Value 1.59 $W/m^2.K$ SHGC 0.26
Window-to-Wall Ratio	Office Areas: 40% General Lab Areas: 10% High and Mid Bay Areas: 5%
Skylight-to-Roof Ratio	None.
Infiltration	0.25 $L/s.m^2$ of envelope surface area, based on NECB
Interior Lighting	10% installed lighting power reduction relative to NECB 2017 Space Type lighting power density
HVAC System Description	**Ventilation Plant** • TSB Head Office o VAV DOAS c/w DCV based on CO2, energy recovery wheel • TSTS Science Office & Public Realm Spaces (offices and collab spaces) o VAV DOAS c/w DCV based on CO2, energy recovery wheel • TSTS Science Spaces (Labs and Workshop) o Multiple VAV DOAS c/w DCV based on CO2, energy recovery wheel **Office Areas** • Ventilation: Pressure independent VAV system for supply air + General exhaust air. • 4-pipe fan coil units distributed heating and cooling terminal system **General Lab & Workshop Areas** • Primary Ventilation and Cooling: Pressure independent VAV (Venturi) system for supply and exhaust air. • 4-pipe fan coil units distributed heating and cooling terminal system
Heat Recovery	Airside recovery design consideration • DOAS energy recovery wheel with minimum sensible effectiveness of 70%, allows both latent and sensible energy exchange.
HVAC Controls	Demand Control Ventilation, systems separate for Labs and Office Areas.
Heating Plant Description	Facility Heating Plant - At the current stage of design, multiple options are still being explored. For the purposes of the preliminary energy model, an electric boiler plant has been modeled. Electric Boilers • Efficiency: constant 98% • Pre-heating by chiller condenser water (up to 100% of condenser water energy) Heating Water Distribution • Heating water system minimum 11C differential between supply and return water. • Outdoor air reset.

Cooling Plant Description	Facility Cooling Plant - At the current stage of design, multiple options are still being explore. For the purposes of the preliminary energy model, a heat recovery chiller plant has been modelled. Heat Recovery Chillers • Three sequenced chillers • COP: 5.50 • Open cooling tower for heat rejection Chilled Water Distribution • Chilled water system minimum 6C differential between supply and return water.
Fans	Supply Fans • Variable speed drive • Total static pressure: 1750 Pa (including heat recovery pressure drop) • Fan efficiency: 82% • Motor efficiency: 90% Return/Exhaust Fans • Variable speed drive • Total static pressure: 1000 Pa • Fan efficiency: 82% • Motor efficiency: 90% Fan Coil Fans • Constant speed • Total static pressure: 200 Pa • Fan efficiency: 42% • Motor efficiency: 65%
Pumps	Heating Pumps • Primary/secondary configuration • Variable speed • Primary pump power: 301 W/l/s • Secondary pump power: 301 W/l/s Cooling Pumps • Primary/secondary configuration • Variable speed • Primary pump power: 70 W/l/s • Secondary pump power: 279 W/l/s
Domestic Hot Water System Description	Domestic hot water systems have been modelled as electric storage systems with recirculation.

4.0 SCIENCE-BASED PROCESS LOADS ANALYSIS

Plug and process loads can represent 25-50% of a typical high-performance building's energy use. In a laboratory building, process-plug energy is generally at the higher end of this range and in some cases beyond 50%. The TSTS Hub supports many energy intense science processes. Every energy use is important when evaluating performance against an absolute target of net-zero carbon, thus significant effort has been allocated to understanding and modelling major science process-plug loads (including supporting systems). Below is a list of the major process loads the design team studied in detail.

1. Spin Rig
2. Burner Rig 1
3. Burner Rig 2
4. High Temperature Material Testing Equipment
5. Heat Treatment and Coatings Lab Equipment
6. Hydraulic Power Plant
7. Central Process Cooling Plant

The design team generated a questionnaire to solicit detailed information on major science process loads. The questionnaire was reviewed by the broader design team and shared with the TSTS Hub during Workshop 5 for comment. To ease completion, the design team pre-populated the questionnaire with as much information as is already known, leaving the areas of uncertainty for the users to complete. The completed questionnaires are included in the Appendix.

The data in each process load questionnaire was translated into an estimated annual energy use for each energy source. This was then included in the building energy model. The Table below is a summary of the estimated annual energy use for each process. The central process cooling plant provides a means of rejecting the heat generated by the various process equipment throughout the facility. The magnitude of heat rejection to the process cooling loop for each of the process loads is summarized below, with the total process cooling plant load being the sum of the individual process cooling load values. The remainder of heat generation is dissipated directly into the space and is handled via the base building air handling unit and terminal cooling systems. The miscellaneous plug loads represent the estimated plug/process loads in all other spaces that are not expected to have unique, energy-consuming scientific process loads, and are based on the plug load density values prescribed in the NECB 2017 by space type.

Table 4-1: Process Loads Energy Use Summary

Energy Type	**Electricity**	**Process Cooling**	**Jet Fuel**
Units	MWh/yr	$MWh_{thermal}$/yr	MWh/yr
Spin Rig	**339**	**83**	**-**
Burner Rig 1	**264**	**12**	**456**
Burner Rig 2	**264**	**12**	
High Temperature Material Testing Equipment	**534**	**135**	**-**
Heat Treatment and Coatings Lab Equipment	**480**	**24**	**-**
Hydraulic Power Plant	**534**	**267**	**-**
IT Loads	**86**	**-**	**-**
Miscellaneous Plug Loads	**535**	**-**	**-**

The relative proportion of the major science-based process loads is summarized below. Approximately 84% of the science-based process energy use is attributed to electricity, whereas the remaining 16% is associated with jet fuel used to operate the burner rigs. Each of the science load analyzed is significant in terms of overall energy use. It should be noted that the energy use will vary widely based on frequency of equipment use, operating schedules as well as the load factor of various components relative to their peak power draws when under different modes of operation. Assumptions were made for these parameters based on the survey responses provided by the science capabilities, however there is uncertainty in these estimates due to the inherent variability in the underlying scientific processes as well as evolving needs over time. The operating assumptions associated with the major science-based process loads should be continually verified with the user groups as the project proceeds towards schematic design and beyond.

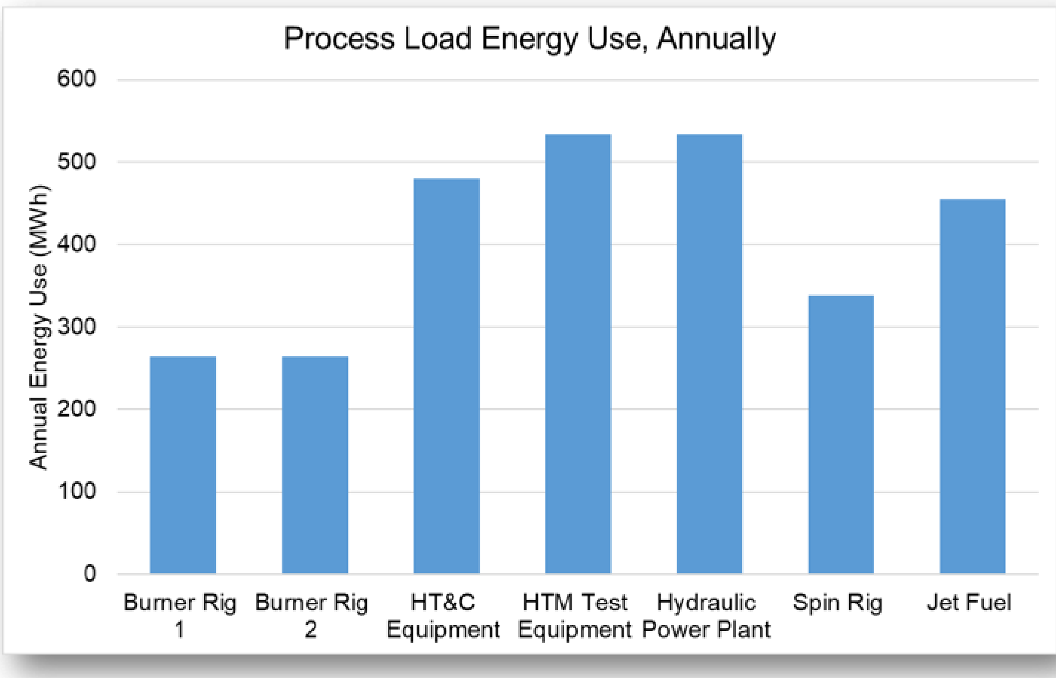


Figure 4.1: Process Load Annual Energy Comparison

5.0 BUILDING ENERGY MODEL RESULTS

The Table below summarizes the key building performance metrics as determined via the whole-building energy model for TSTS Hub:

1. **Total energy use intensity (EUI):** This metric looks at the absolute total energy consumption of the building across all end-uses and focuses on improving overall building energy efficiency and associated operating costs. This metric includes both regulated base building loads as well as science-based process and plug loads.

2. **Thermal energy demand intensity (TEDI):** This metric represents the amount of heating a building needs to offset building envelope losses and temper ventilation air, prior to any mechanical interventions (with the exception of ventilation heat recovery equipment). The intent of this metric is to maximize the performance of passive building systems such as the building envelope, before looking at mechanical methods and technology. In addition to energy savings, prioritizing improvements in the building envelope results in additional co-benefits associated with thermal comfort: acoustic insulation, durability, and increased resiliency to power outages and extreme temperature events.

3. **Greenhouse gas emissions intensity (GHGI):** This metric is similar to TEUI, but instead of focusing on absolute energy use, it focuses on absolute GHG emissions, with the intent of maximizing GHG reductions by prioritizing savings for high GHG fuels, encouraging low carbon fuel choices, and reducing building emissions.

4. **Annual energy cost intensity:** This metric represents the annual utility costs from all energy sources used in the facility, including fuels used to support scientific processes in the facility. A carbon shadow pricing of $300/tonne of CO_2 is also included in the calculated utility costs, per direction from the Treasury Board's Greening Government Strategy.

The calculation of these area-normalized intensity metrics enables the comparison of modelled performance against benchmarking data from other high-performance laboratories in order to determine how the TSTS Hub compares relative to its peer facilities.

Table 5-1: Key Performance Indicators

	Energy Use Intensity	**Thermal Energy Demand Intensity**	**Greenhouse Gas Emission Intensity**	**Annual Energy Cost Intensity**
Abbreviation	EUI	TEDI	GHGI	-
Units	(kWh/m^2 yr)	(kWh/m^2 yr)	($kgCO_2/m^2$ yr)	($\$/m^2$ yr)
	314	62	11	$38.4

5.1 ANNUAL ENERGY USE

The modelled EUI of 314 kWh/m^2.yr for the TSTS Hub is compared to the North American Lab Benchmark Data Set in the Figure below. The modelled EUI is lower than all of the existing facilities (MRL 03, MRL 13, MRL 14 and U100) and places amongst the highest tiers of the overall benchmarking data set.

The modelled performance also compares well against the performance of the Natural Resources Canada, CanMET Materials Testing Lab in Hamilton, ON, which has an EUI of 299 kWh/m^2 yr.

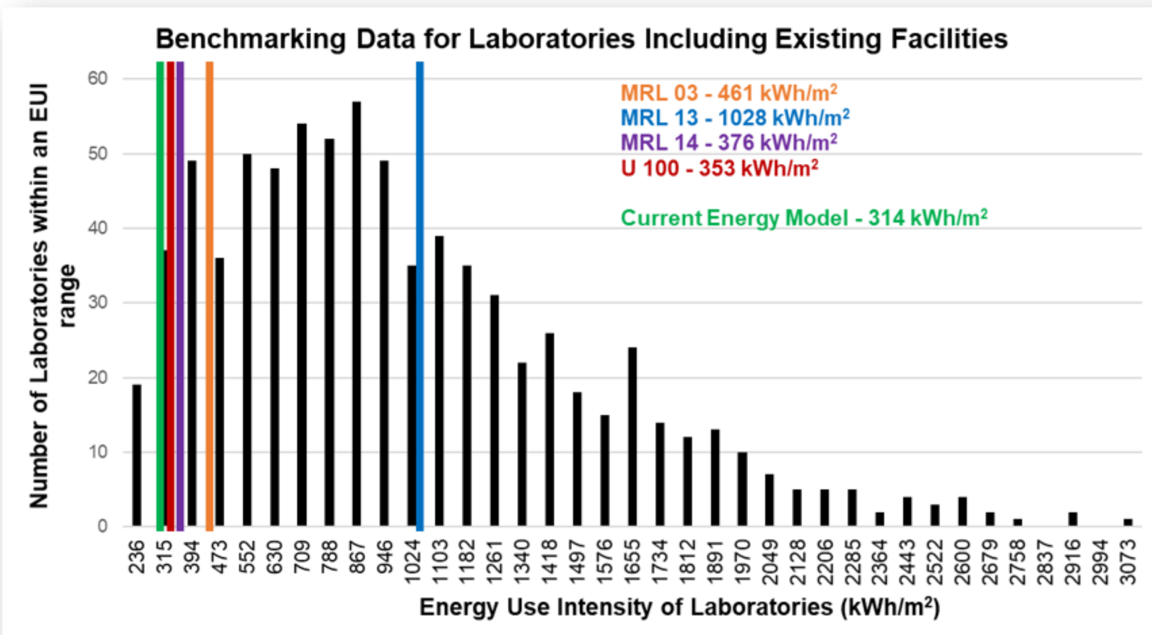


Figure 5.1: Energy Use Benchmarking Data

The energy end-use breakdown is shown in the Figure below. The science-based process loads account for 53% of the overall energy use, as is typical with this building typology. Amongst the regulated building energy uses, space heating and fans collectively account for 9% and 15% of building energy use, respectively, and is primarily attributed to the energy required to move and heat the high volumes of ventilation air required for the facility. The high ventilation air heating loads are also evident in the modelled TEDI value of 62 kWh/m^2 yr, which is significantly higher than the TEDI target of 32 kWh/m^2 yr under the CaGBC Zero Carbon Building program, based on the flexible approach. Managing energy associated with ventilation air will be a key design strategy to improve overall building performance.

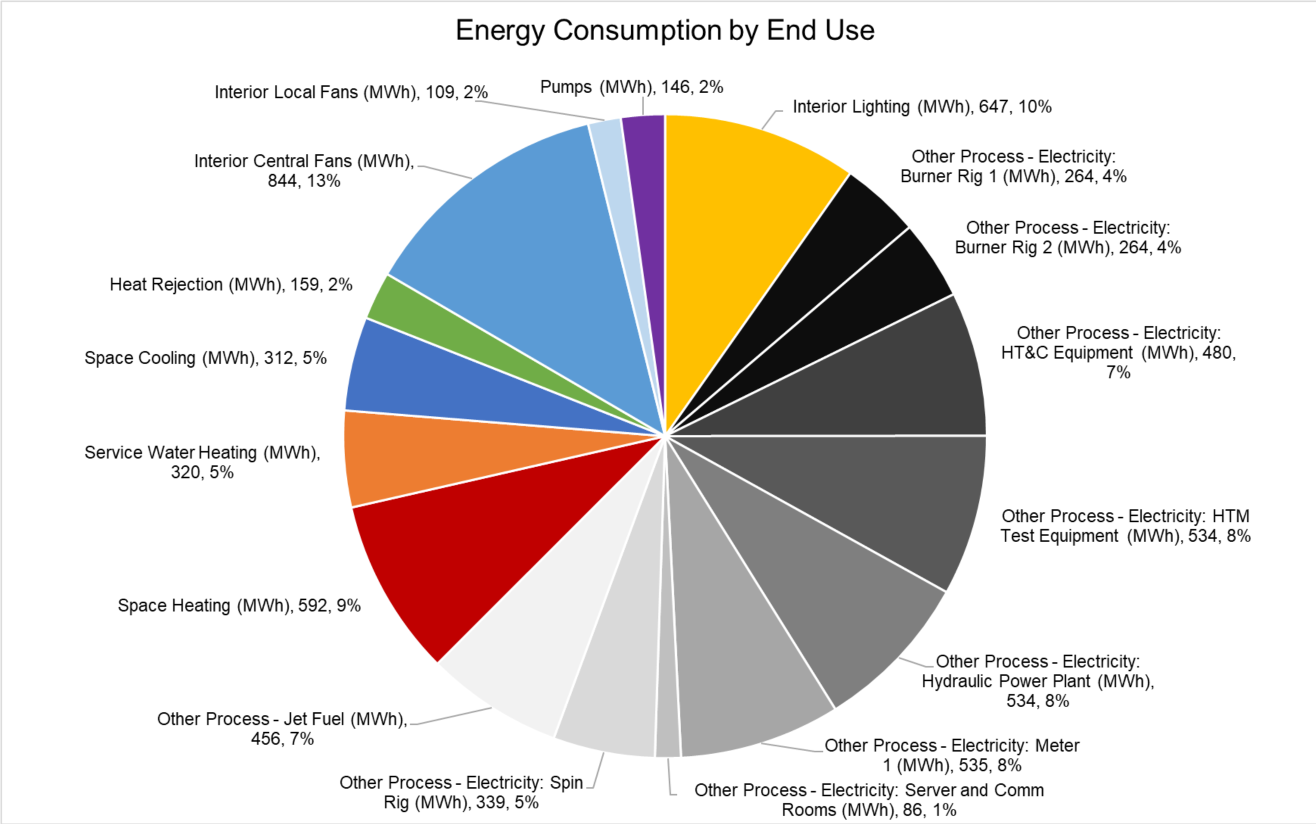


Figure 5.2: TSTS Hub Energy End-Use Breakdown

5.2 GREENHOUSE GAS EMISSIONS

The total modelled annual GHG emissions are approximately 233 tonnes of CO_{2e}, which translates to a GHGI of 11.1 $kgCO_{2e}/m^2$.

The GHG emissions are calculated based on the following emissions factors:

- Electricity: 20 gCO_2/kWh, Ontario electricity grid (per National Inventory Report 1990-2018: Canada's 2020 Submission to the United Nations Framework Convention on Climate Change (April 2020) - Tables A13-1 and A13-14)
- Jet Fuel: 242 gCO_2/kWh

Jet fuel accounts for 47% of the total facility GHG emissions even though it only represents 7% of the facility's annual energy consumption, due to the highly carbon intensive nature of the fuel source.

The overall GHG emissions of the facility are also heavily influenced by the science-based process loads, which collectively account for 73% of total GHG emissions.

The Figure below benchmarks the modelled GHGI of the TSTS Hub (shown as the red dot) relative to benchmarking data in the I2SL database for Climate Zone 6. The modelled GHGI is significantly lower relative due to its peers, due to a combination of improved energy efficiency as well as the very low emissions intensity of the Ontario electricity grid.

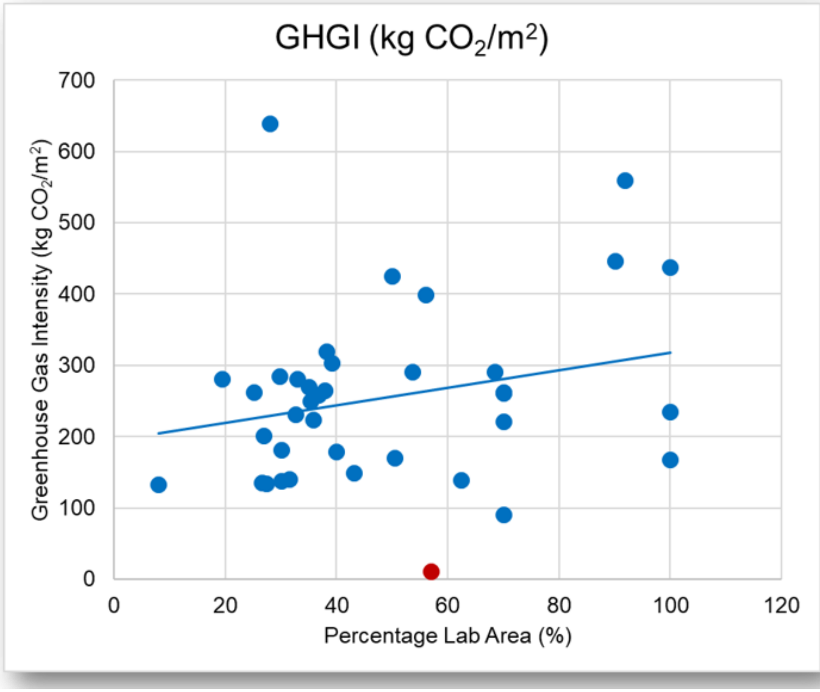


Figure 5.3: GHGI Benchmarking Data

5.3 ENERGY COSTS

The total modelled annual utility costs are approximately $740,685 which translates to an energy cost intensity of $35/m^2, per the breakdown below:

- Electricity: $702,873
- Jet Fuel: $27,812

The utility costs are calculated based on the following utility rates:

- Electricity: $0.114/kWh, per NCR SMPL utility data for FY19
- Jet Fuel: $0.083/kWh

The science-based process loads account for 52% of the total utility costs.

In addition to utility costs, a carbon shadow price of $300/ton results in an annual cost of carbon of approximately $70,067, resulting in total annual energy-related costs of $810,752.

The Figure below benchmarks the modelled energy cost index of the TSTS Hub (shown as the red dot) relative to benchmarking data in the I2SL database for Climate Zone 6. The modelled energy costs are on the lower end of the spectrum compared to its peer facilities, despite the extensive fuel switch to electricity to minimize GHG emissions.

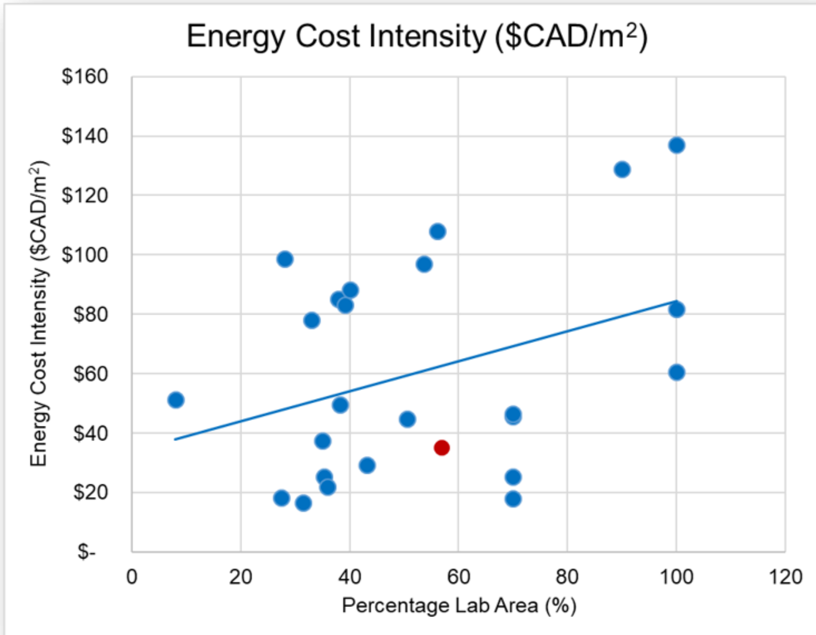


Figure 5.4: Energy Cost Intensity Benchmarking Data

5.4 PARAMETRIC ENERGY MODELLING

In order to identify the key design parameters that drive building performance for the TSTS Hub, a parametric modelling study was conducted for the building inputs listed in Section 2.0. This section outlines some of the key findings of the study.

5.4.1 IMPACT OF BUILDING ENVELOPE

The screenshot below provides a visual indication of the relative impact of building envelope measures on the key whole-building metrics for EUI, TEDI and GHGI.

When viewing the screenshots, note that each vertical line or axis is either an energy model input (right side of screen) or an energy model output (left side of screen). Each wavy line is one, discrete energy simulation. Where the wavy line crosses a particular axis indicates that inputs and outputs that were used or have resulted from that particular simulation.

In the screenshot below, all design parameters are set to their nominal baseline values, except for the building envelope parameters for office/lab window-to-wall ratios, window U-value, as well as roof and wall R-values, which are allowed to float between their minimum and maximum values within their respective parameter ranges.

The difference between the highest and lowest performing envelope bundles translates to an EUI difference of 10 kWh/m^2 yr, or about 3% of overall building energy use. This suggests that building envelope performance is likely not a significant driver of overall energy use, given that the space heating demand is primarily associated with ventilation air heating as opposed to skin losses. However, a high-performance building envelope still provides ancillary benefits related to durability, thermal comfort, and resiliency, and should be pursued for the TSTS Hub. In the case of the TEDI metric, the relative impact is greater (8 kWh/m^2 yr, or about 12% of the modelled TEDI value), given that the metric specifically targets space heating load component as opposed to the overall energy use in the building.

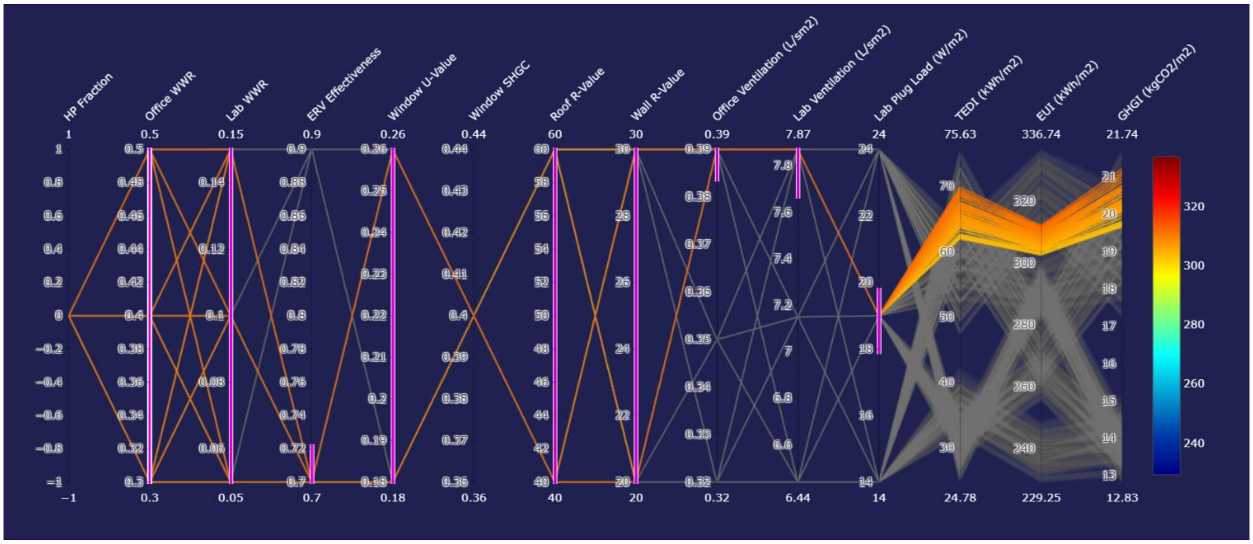


Figure 5.5: Parametric Model Screenshot - Impact of Building Envelope

5.4.2 IMPACT OF VENTILATION RATES

As is typical with the laboratory building typology, the TSTS Hub requires a significant volume of outdoor air delivery in order to remove contaminants and provide a safe working environment for the occupants. However, the energy associated with heating, cooling and delivering ventilation air can be a substantial portion of facility's total energy and GHG emissions profile. For high-performance labs, this is typically addressed through the development of an integrated laboratory safety, sustainability and ventilation management strategy that seeks to optimize the design ventilation rates (expressed in terms of air changes per hour, ACH) for energy efficiency, without compromising safety, space functionality or flexibility for future needs.

Since the details regarding hazards, occupant requirements, thermal loads and space characteristics are not fully developed at the functional programming stage, the intent of the modelling study at this stage is to determine the sensitivity of building performance to variations in lab ventilation rates.

The parametric model was simulated to reduce the overall lab fresh air requirements by 10% and 20% from the baseline ventilation rate ACH assumptions outlined in Section 3.0. Overall, the model indicates that every 10% step reduction in the laboratory ventilation rate correlates to an EUI reduction of approximately 9 kWh/m^2 yr and equivalent carbon emissions reduction of 0.18 kgCO_2/m^2 yr.

As the project proceeds through subsequent stages of design, the development of appropriate ventilation ACH rates for the various laboratory spaces will be essential to optimize the performance of the facility.

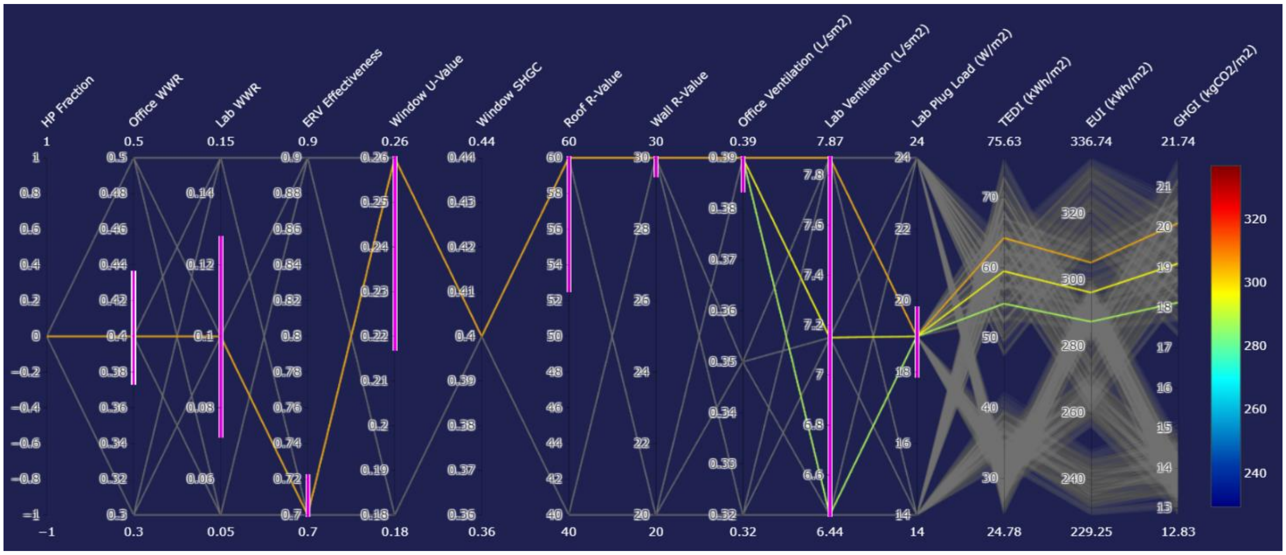


Figure 5.6: Parametric Model Screenshot - Impact of Lab Ventilation Rates

6.0 CARBON NEUTRALITY AND NET ZERO ENERGY READINESS

The current Labs Canada mandate is to strive towards achieving net-zero carbon and net-zero energy ready level of performance for its facilities. This section explores the feasibility of achieving these targets based on the potential on-site renewable energy generation available, while considering the impact of both base building and science process-based energy use and GHG emissions.

6.1 NET-ZERO CARBON

A Net-Zero Carbon building is one in which energy consumption is reduced to a minimum through building design strategies and efficiency measures, as well as through the usage of non-carbon-based fuel sources to meet its energy needs, such that there are no net GHG emissions associated with energy use on an annualized basis.

As evidenced from the energy benchmarking data presented in Section 5.1, the TSTS Hub has the potential to operate at a high level of energy efficiency, with a modelled EUI that puts amongst the highest performing laboratory facilities. Furthermore, the base building systems are designed to be all-electric, which is a low-carbon energy source due to the clean nature of the Ontario electricity grid.

A preliminary renewable energy generation assessment was conducted for the site using Helioscope modelling software and assuming 75% roof area availability for rooftop PV panels, which yielded a PV system size of 1.84 MW_{dc} and annual energy generation of 2,261 MWh, equivalent to a carbon offset of 45 tonnes of $CO_{2,e}$ annually.

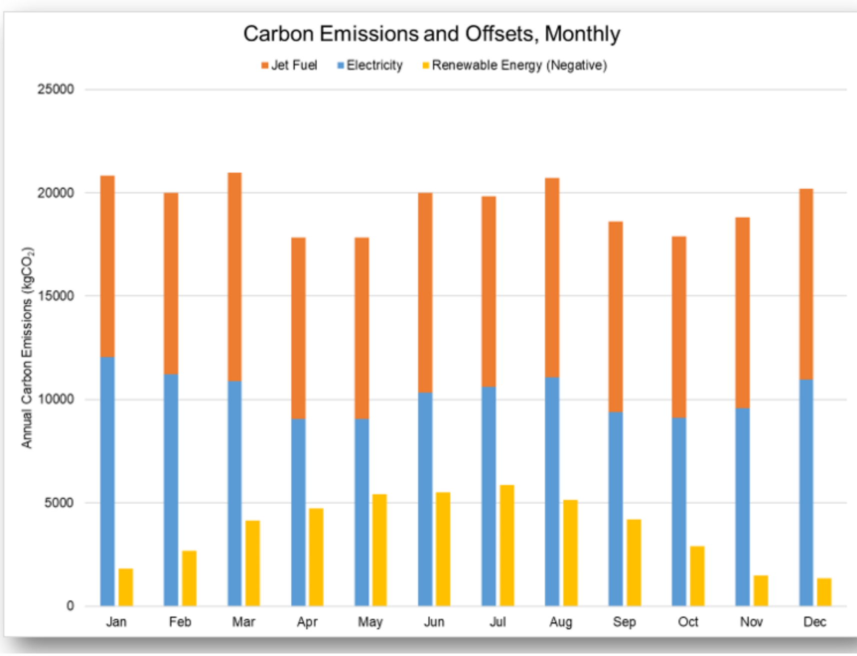


Figure 6.1: Monthly GHG Emissions Profile

The Figure above indicates monthly energy consumption by fuel source relative to on-site renewable energy generation. On-site renewables can offset 19% of annual carbon emissions. In order to bridge the gap towards carbon neutrality, there would be a need to purchase 188 tonnes of carbon offsets, roughly equivalent to 2,820 trees planted annually, or procuring energy from 88,000 m^2 of offsite solar.

However, it is understood that PSPC plans to procure bulk renewable energy certificates to offset all GHG emissions associated with electricity usage at the portfolio-level, effectively rendering electricity as a zero-emissions energy source.

In this case, the base building systems will achieve net-zero carbon (since they are powered 100% by electricity) and there will be approximately 110 tonnes of residual science process-based GHG emissions from jet fuel usage. In this case, the on-site PV would offset approximately 40% of annual GHG emissions, resulting in net annual GHG emissions of 65 tonnes for the facility, all of which is associated with science process-based GHG emissions.

6.2 NET-ZERO ENERGY READY

A Net-Zero Energy Ready building is one in which energy consumption is reduced to a minimum through building design strategies and efficiency measures, to the point where it will be practical in the future to use renewable energy generated on-site to meet its energy needs.

The TSTS Hub energy model includes numerous energy efficiency measures to drive down energy demands towards a net-zero energy ready level of performance, which include:

- High-performing building envelope with low window-to-wall ratio and well-insulated opaque walls
- Low lighting power densities that exceed NECB 2017 requirements
- Dedicated outdoor air systems with decoupled heating/cooling function
- Demand-controlled ventilation for both lab and office space
- Air-side heat recovery using enthalpy wheels
- Efficient central heating/cooling plant with heat recovery to recycle heat between heating and cooling loops
- Low static pressure fan systems

These measures collectively combine to minimize energy use associated with base building systems. Despite the low modelled EUI of 314 kWh/m^2 yr relative to its peers, the TSTS Hub remains an energy-intensive facility due to the science-based process loads which account for more than 50% of the annual energy consumption.

On-site renewable energy in the form of rooftop PV has the potential to offset 34% of annual energy consumption (including science process loads) or about 74% of base building related energy loads. While net zero energy will be challenging to achieve using on-site interventions alone, the low energy demands allow for a substantial portion of building-related energy use to be offset using renewable energy generated on site.

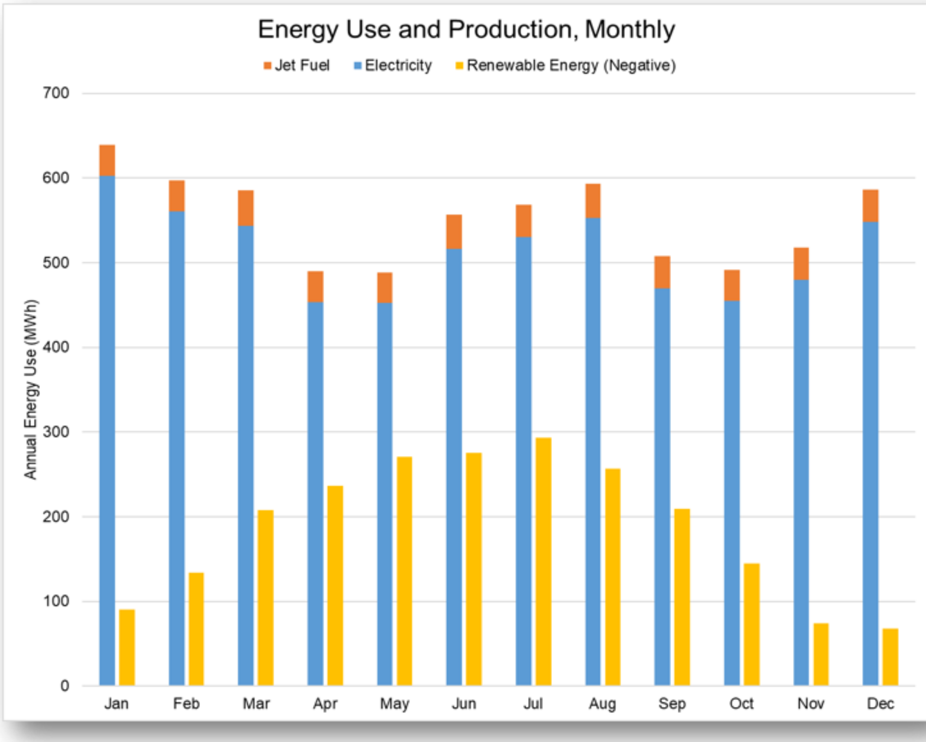


Figure 6.2: Monthly Energy Use Profile

7.0 CONCLUSION

The preliminary energy model developed for the new TSTS Hub demonstrates the potential for a high-performance laboratory with superior energy efficiency and reduced GHG emissions, consistent with Labs Canada design principles for sustainability. The modelled EUI of 314 kWh/m2.yr is 37% lower than the existing facilities average EUI of 501 kWh/m^2yr and places amongst the highest tiers of the I2SL benchmarking data set. Likewise, total modelled annual GHG emissions are approximately 233 tonnes of CO2e, which translates to an emissions intensity of 11.1 kgCO2e/m^2, significantly lower compared to other facilities in the I2SL database.

However, the facility is still energy-intensive in absolute terms, with science-based process loads estimated to account for 53% of annual energy use and 73% of annual GHG emissions. As such, understanding and managing these loads will be essential to meet the energy and carbon performance targets. The operating assumptions associated with the major science-based process loads should be continually verified with the user groups as the project proceeds towards schematic design and beyond.

Energy consumption associated with the building systems is minimized through a combination of passive load reduction measures as well as active energy efficiency measures such as heat recovery and demand-controlled ventilation to reduce energy usage, whereas GHG emissions are reduced through electrification and fuel switching strategies to avoid fossil-fuel based combustion.

A preliminary on-site renewable energy generation assessment indicates that rooftop PV has the potential to offset 34% of annual energy use and 19% of annual GHG emissions. Achievement of carbon neutrality would require the procurement of 188 tonnes equivalent of carbon offsets, roughly equivalent to 2,820 trees planted annually or 88,000 m^2 of offsite solar.

The energy models developed in the functional programming phase will be further refined and used to evaluate multiple test fit and massing options. Energy modelling should be used iteratively throughout the design process as a decision-making tool to optimize key design parameters that influence the energy and carbon performance of the facility.

APPENDIX

A.1 PROCESS LOAD QUESTIONNAIRE – HYDRAULIC PUMPS, M-14 AND M-03

PROCESS-PLUG LOAD QUESTIONNAIRE

Purpose

The purpose of this questionnaire is to understand the unique process-plug loads present in your facilities. This document along with discussions with the users will inform a more detailed process-plug load data sheet.

Why are process loads important?

Process-plug loads can represent a significant portion of building energy use. For high performance buildings, this portion can approach 50% of total building energy use. By understanding the operating characteristics accurately these energy uses will be more accurately represented in the building energy model.

System Name: Hydraulic Pumps, M-14 and M-03

General Information

1. Please provide a brief narrative describing the overall system. In other words what does the system do?

The Hydraulic Power Units provide hydraulic pressure to Full Scale Test actuators (Room 1.1 NRC high-bay) and Load Frames (Room 3.23 Material and Component Testing) used for loading test specimens.

2. What are the major components of the system? In the table below, list and describe the major energy consuming components and describe their function. Add new rows if needed.

Item #	Component of System Name of the individual component or sub-system	Description Describe the function of the component
1	Electric Motors 140 gpm pump (M-14)	Powers Hydraulic supply and high pressure pumps
2	Electric Motors 70 gpm pump (M-03)	Powers Hydraulic supply and high pressure pump.
3	Heat exchanger 140 gpm pump (M-14)	Removes excess heat from hydraulic oil
4	Heat exchanger 70 gpm pump (M-03)	Removes excess heat from hydraulic oil
5		

Energy Demand

3. What energy sources are required for this system? Indicate the energy sources such as electricity, natural gas, propane, process cooling, jet fuel, etc. required. What is the peak energy demand (sometimes referred to as nameplate) for each energy source?

Item #	**Energy Sources** List all energy sources such as electricity, natural gas, etc. for each component or system in the above table.	**Peak Energy Demand** List the peak energy demand in the same order as the energy sources are listed in the column to the left. Indicate units.
1	Electric Motors 140 gpm pump (M-14)	2X 125hp high pressure pump +1X 25hp charger pump
2	Electric Motors 70 gpm pump (M-03)	1x 125hp high pressure pump +1X 25hp charger pump
3	Process Cooling 140 gpm pump (M-14)	Max cooling water Heat Load 318,000Btu See attached Table model 506.18E for cooling water requirements
4	Process Cooling 70 gpm pump (M-03)	Max cooling water Heat Load 191,000Btu See attached Table model 506.61E for cooling water requirements

Heat Rejection

4. Does the system reject heat? If so, how much? is the heat rejected to the room, a dedicated exhaust system or process cooling loop? What is the temperature of the rejected heat (°C)?

Item #	**Heat Rejection** Indicate the heat rejection for each component or sub-system	**Heat Rejection Temperature (°C)**	**Heat Rejection Medium** To ambient space, outdoors, to dedicated exhaust system, to process cooling, other?
1	Amounts Unknown	Unknown	See attached spec sheet

Operating Profile

5. Does the system have different operating modes? Name each mode and describe the mode.

Mode #	**Operating Mode** Name the operating mode	**Description** Describe what happens during the mode
1	Warm up	Pump turned on with very little flow ½ hr to 1 hr to warm up oil and actuator valves. (Low load)
2	Testing	Test operation. Various times. 1 hr to several days. (variable Load depending on projects)

6. How often does the system operate? Can you estimate the number of hours per typical week, month or year? If there are different operating modes listed under Question 5 estimate the (weekly/monthly/yearly) hours in each operating mode.

Room 1.1 pump runs when there is requirement. 500 to 8000 hrs./year. Average 2000-3000 hrs./year. Room 3.23 depending on demand 3000-4000 hrs./year.

7. For each operating mode listed under Question 5, which components are at peak energy demand and which are at part load. For equipment at part load, indicate the percentage of peak load.

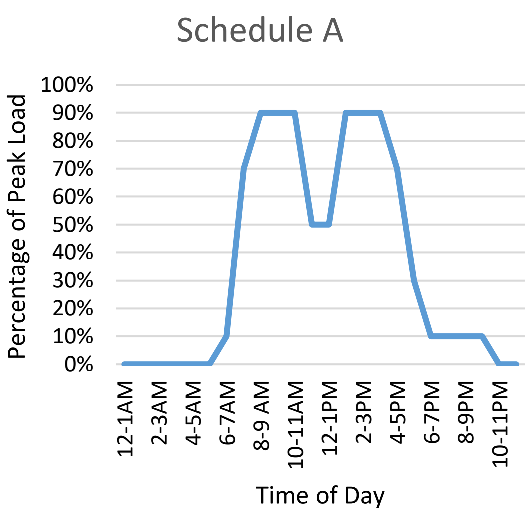
No components are typically at peak load. Percentage of peak load is variable from low to 70%

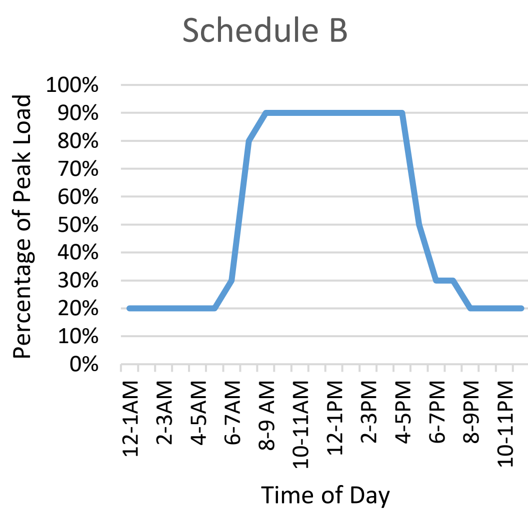
Mode #	**Components at Peak Energy Demand** These components are at or near their nameplate power/energy demand	**Components at Part Load** These components are below their peak operating capacity. Indicate in percentage terms their loading relative to peak capacity
1		
2		

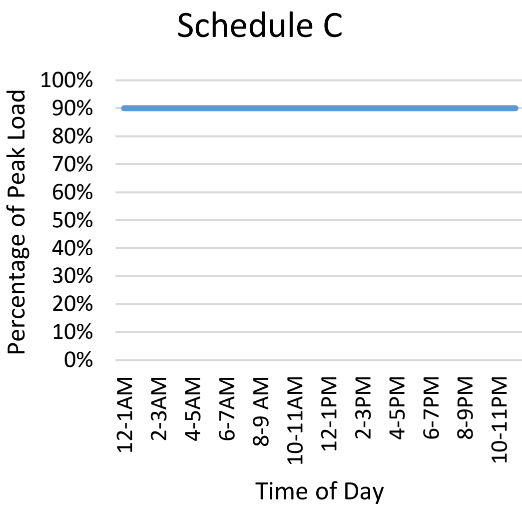
8. Overall does one of the four operating profiles shown below represent typical operation? If none apply, can you modify one to suit how the equipment operates. Alternatively, describe the operating profile?

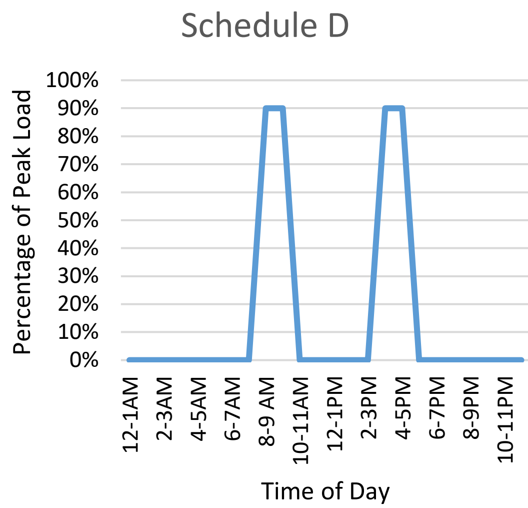
Type a response here

Room 1.1 would have a profile similar to schedule B at times with the percentage of peak load dependent on the project, and at other times it would be similar to Schedule C with the percentage of peak load dependent on the project.
Room 3.23 would be similar to Schedule B with the upper and lower levels being variable depending on the amount and type of testing being done.









Other

9. Are there plans to upgrade or replace this system or components soon? Are there ideas or plans to improve the efficiency of this system already in place?

Replacement of both these systems is planned when relocation happens. The systems are old and noisy. New systems are very quiet. The 2 replacement systems planned are MTS 150 gpm pump mod. 505.150 specifications attached to replace the old 506.81E and MTS 90 gpm pump mod. 505.90 specifications attached to replace the old 506.61E

10. Do you have any other comments or information relevant to the operation or operating energy of this piece of equipment?

See specifications below of current pumps and future pumps. When demand is low it is possible that only one pump could supply the High Bay Room 1.1 and the SI portion of the Material and Component Testing Room 3.23. This information does not include the HTM requirements. There is no normal usage for the pump in Room 1.1. It may run 24/7 at high or low capacity for the majority of the year or may be off for the majority of the year depending on the phase of project/projects that are being carried out. The Pump for the Material and Component Testing Room 3.23 often runs 24/7 at various capacities but generally at lower capacity during off hours. Since these new pumps consist of a bank of 30 gpm pumps to generate max flow only the number required to generate the required flow run at that time.

Pump protection is provided for the main pump(s) . The main pump(s) is protected by the supercharge pressure switch that turns the supply off if supercharge pressure drops below the recommended operating pressure. The supercharge pump and main pump(s) are protected by a low-level switch which turns the supply off if the level of hydraulic fluid in the reservoir drops below a preset level.

The purpose of the accumulator is to smooth the HPS output and to provide additional hydraulic fluid pressure for high instantaneous flow demands. To accomplish this, the accumulator is precharged to a pressure proportional to the HPS output pressure.

The hydraulic power supply includes, as standard equipment, a 24 Vdc electrical power supply for operating solenoid valves and relays both on the 506 itself and elsewhere in the system, such as on service manifolds and load frame crosshead locks. The current available for external use throughout the system is listed in the Specifications section. All solenoid valves connected to this supply must be rated at 24 Vdc. If the 115 Vac control voltage option is required, all solenoid valves connected to the supply must also be rated at 115 Vac, refer to the Options section.

Specifications

	506.41E	506.51E	506.61E (M-3)	506.71E	506.81E (M-14)
MAXIMUM CONTINUOUS PRESSURE	3000 psi (21 MPa)	3000 psi (21 MPa)	3000 psi (21 MPa)	3000 psi (21 MPa)	3000 psi (21 MPa)
MAXIMUM FLOW CAPACITY					
At 60 Hz, gpm (ℓ/min):	40 (151)	55 (208)	70 (265)	110 (416)	140 (530)
At 50 Hz) (optional), gpm (ℓ/m)	40 (151)	55 (208)	62 (235)	110 (416)	124 (470)
MAIN PUMP MOTOR, hp (kw):	75 (56)	100 (75)	125 (93)	100 (75) × 2	125 (93) × 2
3-PHASE CURRENT AT 460 V, 60 Hz[1]					
Inrush /Continuous Amps:	400/115	525/145	630/175	670/285	805/350
3-PHASE CURRENT AT OPTIONAL 380V, 50Hz[1]					
Inrush/Continuous Amps:	225 / 115	340 / 175	380 / 195	530 / 340	600 / 380
STARTER TYPE					
For 60 Hz:	Part Winding	Part Winding	Part Winding	Part Winding	Part Winding
For 50 Hz:	Wye-delta	Wye-delta	Wye-delta	Wye-delta	Wye-delta
24 V EXT HYD CONTROL AMPS, 60 Hz (50 Hz)	9A (8.1A)	A (8.1A)	9A (8.1A)	6.8A (6.1A)	6.8A (6.1A)
WATER HOSE REQUIRED (I.D.):	1-1/4 in. (32 mm)	1-1/4 in. (32 mm)	1-1/4 in. (32 mm)	2 in. (51 mm)	2 in. (51 mm)
WATER REQUIRED:	(See Cooling Water Table)				
MAXIMUM COOLING WATER HEAT LOAD					
Btu per hour:	191,000	254,000	318,000	509,000	636,000
Kilocalories per hour:	48,000	64,000	80,000	130,000	160,000

Specifications (continued)

	506.41E	506.51E	506.61E	506.71E	506.81E
ATMOSPHERIC HEAT LOAD [2]					
Btu per hour (60 Hz power):	20,000	28,000	35,000	56,000	70,000
Kilocalories per hour (optional 50 Hz power):	4,200	7,000	8,000	14,000	16,000
MAX. AMBIENT OPERATING TEMPERATURE: [3]	104°F (40°C)	104°F (40°C)	104°F (40°C)	104°F (40°C)	104°F (40°C)
MIN. AMBIENT OPERATING TEMPERATURE:	40°F (4.4°C)	40°F (4.4°C)	40°F (4.4°C)	40°F (4.4°C)	40°F (4.4°C)
NOISE RATING, dBa AT 3 ft (APPROX. 1 m): [4]	90	92	92	100	100
RESERVOIR CAPACITY, GAL (ℓ):	200 (757)	200 (757)	200 (757)	350 (1330)	350 (1330)
HYDRAULIC FLUID FILTRATION (MICRONS)					
Full flow high pressure:	10	10	10	10	10
Full flow fine filter, nominal / absolute:	0.45 / 3	0.45 / 3	0.45 / 3	0.45 / 3	0.45 / 3
HYDRAULID FLUID HOSE CONNECTIONS [5]					
Pressure (37° flare):	− 20 (1)	− 20 (1)	− 20 (1)	− 20 (2), − 32 (1) [6]	− 20(2), − 32 (1) [6]
Return (37° flare):	− 20 (1)	− 20 (1)	− 20(1)	− 24 (2), − 32 (2) [6]	− 24 (2), − 32 (2) [6]
Drain (37 flare):	− 12 (1) − 8(1) − 6(1)	− 12 (1) − 8(1) − 6(1)	− 12(1) − 8(1) − 6(1)	− 24(1) − 16(1) − 12(1) -8(1)	− 24(1) − 16(1) − 12(1) -8(1)
HEIGHT WITH CASTERS, in. (mm):	59 (1500)	61 (1550)	61 (1550)	73 (1854) [7]	73 (1854) [7]
LENGTH, in. (mm):	89 (2260)	89 (2260)	89 (2260)	108 (2743)	108 (2743)
WIDTH, in. (mm):	44 (1120)	44 (1120)	44 (1120)	60 (1524)	60 (1524)
WEIGHT WITH FLUID (UNCRATED), lb (kg):	5000 (2268)	5500 (2495)	5750 (2610)	10,000 (4536)	10,500 (4763)

1 Currents listed are typical values. Maximum values may be as much as 10 to 15% higher. The 460 V rating is for part-winding starter. The 380 V rating is for wye-delta starter.

2 If the Hydraulic Power Supply is operated in a small room, an exhaust fan is necessary for removal of the atmospheric heat load.

3 Unless otherwise specified.

4 Noise level in a small room can be up to 10 dBa greater than the free-field value. Noise-reducing enclosures are available. Information on soundproof pump rooms is also available. Contact MTS Systems Corporation.

5 Number of connections are shown in parentheses.

6 Standard connection for -32 size is 4-bolt O-ring flange per SAE J518, code 61.

7 Ceiling height of 8 ft 2 in. (2.5 m) is required for fine filter element replacement. For 8 ft (2.5 m) ceiling heights the casters can be removed to lower the Hydraulic Power Supply by 7 in. (17 cm).

Specifications are subject to change without notice. Contact MTS for specifications critical to your needs.

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Table 1. Cooling Water Requirements

Water Pressure required: 30 to 45 psid (0.2 to 0.3 MPa)
Maximum allowable pressure: 120 psig (0.8 MPa)
Flow rate (± 20%): As shown below.

Standard Heat Exchanger Models	Cooling Water Inlet Temperature						
	60°F 15.5°C	65°F 18.3°C	70°F 21.1°C	75°F 23.8°C	80°F 26.7°C	85°F 29.4°C	90°F 32.2°C
506.41E gpm: ℓ/min:	15 57	15 57	15 57	15 57	17 64	25 95	37 140
506.51E gpm: ℓ/min:	15 57	17 64	26 98	60 227	See optional oversize heat exchanger models (below)		
506.61E[1] gpm: ℓ/min:	15 57	15 57	15 57	17 64	24 91	35 132	59 223
506.71E gpm: ℓ/min:	30 114	35 132	53 201	120 454	See optional oversize heat exchanger models (below)		
506.81E gpm: ℓ/min:	30 114	48 182	100 378				
	Optional Oversize Heat Exchanger Models						
506.41E-O gpm: ℓ/min.	15 57	15 57	15 57	15 57	15 57	20 76	27 102
506.51E-O gpm: ℓ/min:	15 57	15 57	15 57	15 57	17 64	25 95	37 140
506.71E-O gpm: ℓ/min.	30 114	30 114	30 114	30 114	36 136	52 197	74 280
506.81E-O gpm: ℓ/min:	30 114	30 114	30 114	32 121	45 170	69 261	100 378

[1] An oversize heat exchanger is standard equipment on Model 506.61E.

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Model 505.150 HPU Specifications

FOR NRC HIGH BAY
SPACE ID ~~3.23~~ 1.1

Parameter		Specification
Pump/Motor		Wye-Delta starter configuration
	Number of pump/motors	5
	Maximum continuous pressure	21 MPa (3000 psi)
	Maximum flow capacity	500 L/m (133 gpm) at 50 Hz 567 L/m (150 gpm) at 60 Hz
	Motor rating*	45 kW (60 hp) at 50/60 Hz
	Current draw†	387 A continuous at 460 V AC 60 Hz 476 A continuous at 380 V AC 50 Hz
Reservoir capacity		1893 L (500 gal) maximum 1211 L (320 gal) minimum
Water flow rating (input temperature)		
	10°C (50°F)	87.8 L/m (23.2 gpm)
	15.5°C (60°F)	94.6 L/m (25 gpm)
	21.1°C (70°F)	121.1 L/m (32 gpm)
	26.7°C (80°F)	159.0 L/m (42.0 gpm)
	32.2°C (90°F)	265.0 L/m (70 gpm)
Heat load (maximum)		224 kW (765,000 Btu/hr)
Dimensions		
	Length	4270 mm (168 in)
	Height	2006 mm (79 in)
	Width	990 mm (39 in)
Weight		
	Empty	3313 kg (7305 lb)
	With hydraulic fluid	4372 kg (9638 lb) minimum fluid level 4979 kg (10977 lb) maximum fluid level
Noise‡ rating at 1 m		71 dB(A) fully compensated

* For one motor

† For all motors

‡ Sound pressure level [dB(A)] is expressed as a free field value. Readings may vary with the acoustic environment.

Model 505.90 HPU Specifications

FOR SI GROUP MID BAY
SPACE ID ~~1st~~ 3.23

Parameter	Specification
Pump/Motor	Wye-Delta starter configuration
Number of pump/motors	3
Maximum continuous pressure	21 MPa (3000 psi)
Maximum flow capacity	300 L/m (80 gpm) at 50 Hz 340 L/m (90 gpm) at 60 Hz
Motor rating*	45 kW (60 hp) at 50/60 Hz
Current draw†	233 A continuous at 460 V AC 60 Hz 281 A continuous at 380 V AC 50 Hz
Reservoir capacity	950 L (250 gal) maximum 605 L (160 gal) minimum
Water flow rating (input temperature)	
10°C (50°F)	56.0 L/m (14.8 gpm)
15.5°C (60°F)	64.3 L/m (17 gpm)
21.1°C (70°F)	83.3 L/m (22 gpm)
26.7°C (80°F)	128.7 L/m (34 gpm)
32.2°C (90°F)	268.7 L/m (71 gpm)
Heat load (maximum)	134.4 kW (459,000 Btu/hr)
Dimensions	
Length	2870 mm (113 in)
Height	2006 mm (79 in)
Width	990 mm (39 in)
Weight	
Empty	2138 kg (4714 lb)
With hydraulic fluid	2711 kg (5977 lb) minimum fluid level 3051 kg (6726 lb) maximum fluid level
Noise‡ rating at 1 m	68 dB(A) fully compensated

* For one motor

† For all motors

‡ Sound pressure level [dB(A)] is expressed as a free field value. Readings may vary with the acoustic environment.

B.1 PROCESS LOAD QUESTIONNAIRE – SPIN RIG

PROCESS-PLUG LOAD QUESTIONNAIRE

Purpose

The purpose of this questionnaire is to understand the unique process-plug loads present in your facilities. This document along with discussions with the users will inform a more detailed process-plug load data sheet.

Why are process loads important?

Process-plug loads can represent a significant portion of building energy use. For high performance buildings, this portion can approach 50% of total building energy use. By understanding the operating characteristics accurately these energy uses will be more accurately represented in the building energy model.

System Name: Spin Rig, Spin Rig Control Room

RDS Reference(s): RDS-013-1, RDS-014-1, RDS-015-1
Space ID(s): 3.5, 3.6, 3.7
Quantity: 1 unless otherwise noted
Documents Reviewed:

- MajorPower-Spin Rig and Burner Rig Facilities – Final.xlsx
- Spin-Rig.pptx
- 4-04-001 TSTS Equipment List (V3.15) – 4 Sep 2020.xlsx
- 2020- 08 17 – Room Data Sheet V4.xlsx
    - RDS-013-1
    - RDS-014-1
    - RDS-015-1

General Information

11. Please provide a brief narrative describing the overall system. In other words what does the system do?

    The Spin Rig and associated components is a test system used for accelerating test specimens to high rotational speed. It includes a test cell, vacuum skid, compressed air drive system, control console and ~~make up~~ air handling unit.

12. What are the major components of the system? In the table below, list and describe the major energy consuming components and describe their function. Add new rows if needed.

Item #	Component of System Name of the individual component or sub-system	Description Describe the function of the component
1	Test cell	Test device (vessel) which contains the rotating test specimen. The test cell does not technically consume any power.
2	Vacuum Skid	A system to produce a vacuum within the test cell, exhaust connection to outdoors. The vacuum skid is the energy hub for the spin rig system and there are three

Item #	**Component of System** Name of the individual component or sub-system	**Description** Describe the function of the component
		major power consumers on this skid; the Roots Blower, Vacuum Pump and the furnace controls. It also supplies power to the control console as well as a dedicated UPS. The power requirements are listed in item #2 of the energy demand section below.
3	~~Make Up~~ Air Handling Unit	Packaged HVAC equipment to compliment exhaust from the vacuum skid and air turbine. The power requirements are listed in item #3 of the energy demand section below.
4	Spin Rig Console	Control unit for spin rig system located in an adjacent room. The Power for this unit comes through the Vacuum Skid.
5	Compressed air drive system	Generates compressed air to accelerate the spin rig, provides 1200 ACFM @ 100 PSIG to test cell. The power requirements are listed in item #5 of the energy demand section below.

Energy Demand

13. What energy sources are required for this system? Indicate the energy sources such as electricity, natural gas, propane, process cooling, jet fuel, etc. required. What is the peak energy demand (sometimes referred to as nameplate) for each energy source?

Item #	**Energy Sources** List all energy sources such as electricity, natural gas, etc. for each component or system in the above table.	**Peak Energy Demand** List the peak energy demand in the same order as the energy sources are listed in the column to the left. Indicate units.
1	Shop Air, Cooling water (Shop Air is from a compressor not associated with the spin rig)	25 SCFM @ 60 PSIG
2	Electricity, Cooling water (For the Vacuum Skid, Cooling water to the Vac Skid, specifically for the spin rig lid during heated testing. Water is on a solenoid that opens when cooling is required)	480V 3p 80 Amps, 1 GPM < 80 °F
3	Electricity (For the Air handling exhaust)	600V 15 Amps
4	Electricity (For items such as Function Generator or Scope and cell camera monitoring equipment)	2x 120V 15A power
5	Electricity, process cooling water (For Air Compressor)	600V 3P 400 Amps (300 HP), 8 L/s > 32 °C

Heat Rejection

14. Does the system reject heat? If so, how much? is the heat rejected to the room, a dedicated exhaust system or process cooling loop? What is the temperature of the rejected heat (°C)?

Item #	**Heat Rejection** Indicate the heat rejection for each component or sub-system	**Heat Rejection Temperature (°C)**	**Heat Rejection Medium** To ambient space, outdoors, to dedicated exhaust system, to process cooling, other?
1	Test Cell – Air Turbine	Unknown	Process cooling is to stop heat from creeping up the lip seal and melting Air through the turbine is evaluated in the air handling unit. Some heat generation created by work done, but mainly handled by oil cooling in the damper. Heat rejection is unknown.
2	Vacuum Skid A) SV630B B)RuVac2001Wa	Up to 80 for A Up to 200 B	For A, the fan cooled heat exchanger has been recorded at ~65 ºC. B, has never been measured as it is not an actively cooled system. Equipment, piping and walls have been measured up to 48 ºC during testing in the spring season (+10 ºC outside)
3	Air handling exhaust	Limited	Extracts mainly turbine air, chamber exhaust from vacuum. Vents are opened to assist in air removal from room.
4	Control Console area	Unknown	3 computers, with LED monitors, 1 3000 KVA fan cooled UPS.
5	May have notable cooling load (8 L/s)		Oil temperature in system maintains a temperature of 85 ºC. Even with Current cooling, room will heat up and is equipped with automatic wall vents to accommodate air intake and cooling.

Operating Profile

15. Does the system have different operating modes? Name each mode and describe the mode.

Mode #	**Operating Mode** Name the operating mode	**Description** Describe what happens during the mode
1	Test heat up	Demand on the Vacuum skid is high due to power heater being used over and above maintaining vacuum. Air demand is not required or low. Testing heat up requires 24 hours. Compressor is at idle or off
2	Simple Cycle	Power to skid is reduced as furnace is only maintaining temperature of the coupon and holding vacuum. Compressor can be loaded up to 75% of capacity depending on rotor article. Testing in this state lasts a week to months
3	Complex Cycle	Power to skid is reduced as furnace in only maintaining temperature of the coupon and holding vacuum. Compressor can be loaded up to 90% of capacity depending on rotor article, and the dynamics of the tests constant drive and brake air. Testing of this nature lasts around 1 week
4	Proof / Burst	Power to skid is reduced as furnace in only maintaining temperature of the coupon or there is no heating. Skid is holding vacuum. Compressor can be loaded up to 95% of capacity depending on rotor article, and the dynamics of the tests constant drive and brake air. Testing lasts a few hours to 1 day.
5	Test Cool Down	Only Vacuum is maintained. No power for heating or compressor running. This state lasts 24-36 hours

16. How often does the system operate? Can you estimate the number of hours per typical week, month or year? If there are different operating modes listed under Question 5 estimate the (weekly/monthly/yearly) hours in each operating mode.

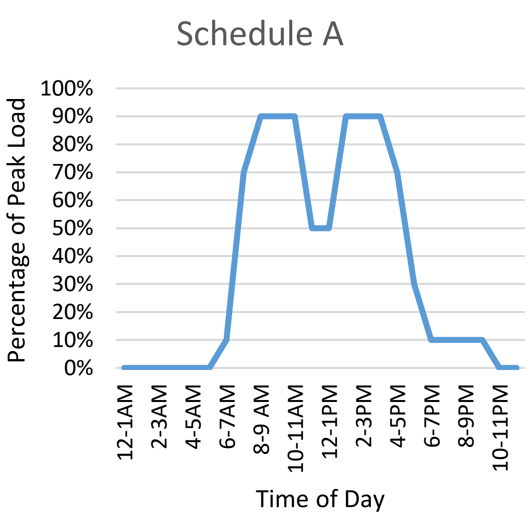
Rig runs 500-1000 hours a year. It is rare to operate at full load.

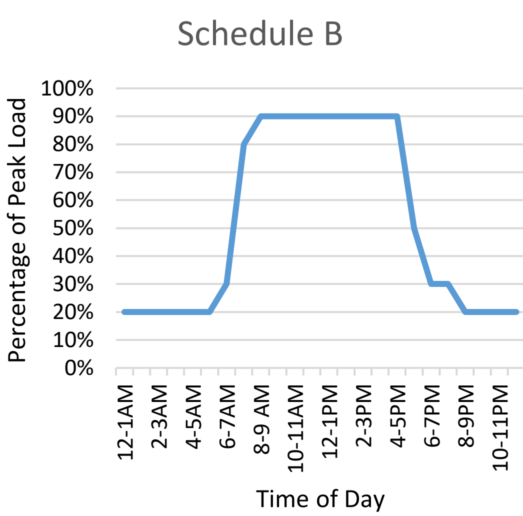
17. For each operating mode listed under Question 5, which components are at peak energy demand and which are at part load. For equipment at part load, indicate the percentage of peak load.

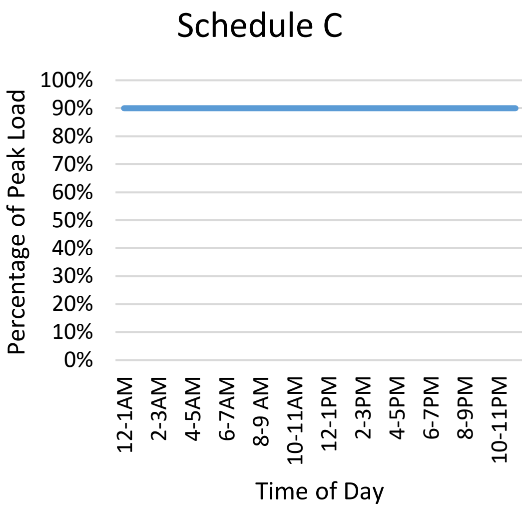
Mode #	**Components at Peak Energy Demand** These components are at or near their nameplate power/energy demand	**Components at Part Load** These components are below their peak operating capacity. Indicate in percentage terms their loading relative to peak capacity
1	Vacuum Skid, Air Handling Unit, Process Water	Compressor 0% to 50%
2	Air Handling Unit, Process Water, Compressor	Vacuum Skid 60%
3	Air Handling Unit, Process Water, Compressor	Vacuum Skid 60%
4	Air Handling Unit, Process Water, Compressor	Vacuum Skid 60%
5	Air Handling Unit, Process Water,	Vacuum Skid 50%, Compressor 0%

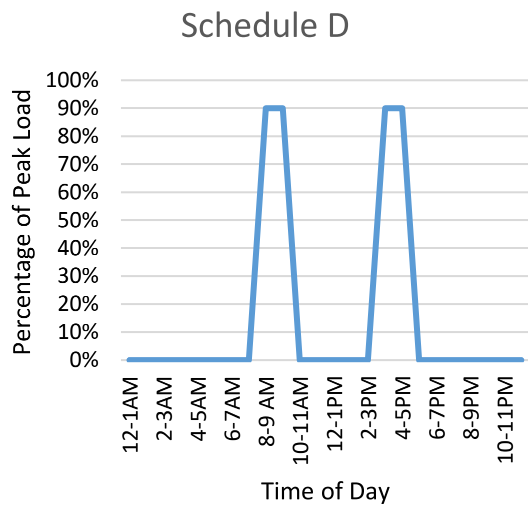
18. Overall does one of the four operating profiles shown below represent typical operation? If none apply, can you modify one to suit how the equipment operates. Alternatively, describe the operating profile?

Normally, Mode 1 and Mode 5 3-4 times a year. Mode 4 there are typically 1-2 weeks of this with the remainder of the time in Mode 2 or Mode 3. Most common testing mode is Mode 2.









Other

19. Are there plans to upgrade or replace this system or components soon? Are there ideas or plans to improve the efficiency of this system already in place?

Water cooling for the SV 630B is suggested as there is a kit for this. Test Devices does have a fully electric drive system that is regenerative on brake. Current power savings without the regenerative brake is 1/3 the power consumption of the compressor. System conversion for a similar configuration is $400000 US.

20. Do you have any other comments or information relevant to the operation or operating energy of this piece of equipment?

Additional automation control to shut down the compressor in the event that the spin rig hits a warning limit. Currently the compressor is fully independent of the spin rig controls.

C.1 PROCESS LOAD QUESTIONNAIRE – BURNER RIG 1

PROCESS-PLUG LOAD QUESTIONNAIRE

Purpose

The purpose of this questionnaire is to understand the unique process-plug loads present in your facilities. This document along with discussions with the users will inform a more detailed process-plug load data sheet.

Why are process loads important?

Process-plug loads can represent a significant portion of building energy use. For high performance buildings, this portion can approach 50% of total building energy use. By understanding the operating characteristics accurately these energy uses will be more accurately represented in the building energy model.

System Name: Burner Rig 1

RDS Reference(s): RDS-021-1, RDS-022-1
Space ID(s): 3.13, 3.14
Quantity: 1
Documents Reviewed:

- 2020 09 15 - Room Data Sheet V5.xlsx
  - RDS-021-1, RDS-022-1
- 4-04-001 TSTS Equipment List (V3.15).xlsx
- NRC Burner Rigs 1 and 2.pptx

General Information

1. Please provide a brief narrative describing the overall system. In other words what does the system do?

System subjects new jet engine materials, coating, and/or components to a representative hostile (high temperature, high velocity, etc) environment found inside turbine engines.

2. What are the major components of the system? In the table below, list and describe the major energy consuming components and describe their function. Add new rows if needed.

Item #	**Component of System** Name of the individual component or sub-system	**Description** Describe the function of the component
1	Combustor	Burner rig served by the air manifold and supported on the combustor stand.
2	Control Console	Electronic control unit

Item #	Component of System Name of the individual component or sub-system	Description Describe the function of the component
3	Room Exhaust	Room exhaust system capable of removing up to 10000 CFM
4	Compressed air system	Provides air for the burner rigs to operate.
5	Air dryer	Removes the moisture from the compressed air by dropping the dew point for testing consistency
6	Make up air unit	Provides air for the compressor instead of taking it from the building.
7	Fuel pump (1)	Pump 1 can either provide higher volume (12 GPH), lower pressure fuel (15 PSIG) or lower volume, high pressure fuel (<7.5 GPH @ <200 psig).

Energy Demand

3. What energy sources are required for this system? Indicate the energy sources such as electricity, natural gas, propane, process cooling, jet fuel, etc. required. What is the peak energy demand (sometimes referred to as nameplate) for each energy source?

Item #	Energy Sources List all energy sources such as electricity, natural gas, etc. for each component or system in the above table.	Peak Energy Demand List the peak energy demand in the same order as the energy sources are listed in the column to the left. Indicate units.
1	Liquid fuel, domestic water, gas fuel (NG), compressed air	12 GPH @ 15 PSIG, ½ inch pipe, ~800 CFH, 550 ACFM @ 100 PSIG
2	Electricity	120 AC 20 Amp
3	Electricity	600 V 15 A
4	Electricity, cooling water	600 V 400 Amps, 6 L/s
5	Electricity, cooling water	600 V 15 Amps, 1.25 L/s
6	Electricity	600 V 15 A
7	Fuel pump (1)	120 V 15 A

Heat Rejection

4. Does the system reject heat? If so, how much? is the heat rejected to the room, a dedicated exhaust system or process cooling loop? What is the temperature of the rejected heat (°C)?

Item #	Heat Rejection Indicate the heat rejection for each component or sub-system	Heat Rejection Temperature (°C)	Heat Rejection Medium To ambient space, outdoors, to dedicated exhaust system, to process cooling, other?
1	Burner rig Fuel Source	<1650	<300KJ/s into exhaust plenum that is drawn out of the room by an exhaust fan. Room is vented to the outside with variable pitch louvers to chain air flow draw from the room.
2	Console and console controlled devices	<45	< 1.5 KJ/s, typically closer to 1 -1.2 KJ/s during operation. This includes pumps and motors located in the rig room. In control room power <0.6KJ/s
3	Exhaust Fan	Unknown	< 7.5 KJ/s. Unit is located on the exterior of the roof.
4	Air Compressor	<100	Single Burner Rig uses <115 KJ/s. If both rigs are in use < 175 KJ/s. System is water cooled and cooling water on inlet side is >29 C, outlet side can exceed 45 C depending on usage/demand of air compressors and oil heat exchangers. System will shutdown if oil temperature reaches 100 C.
5	Air Dryer	<90	Air is cooled to 3 C. S.S use of >7.5 KJ/s. System is Water cooled but no outlet temperature recorded. Will shutdown if temperature switch on system reaches 90C.
6	Makeup Air Unit	Unknown	<1.5 KJ/s. Unit is located on exterior of building
7	Lower pressure fuel pump	Unknown	<1.5 KJ/s. Unit is located in Fuel Farm

Operating Profile

5. Does the system have different operating modes? Name each mode and describe the mode.

Mode #	Operating Mode Name the operating mode	Description Describe what happens during the mode
1	Advanced engine durability testing	Fuel consumption is higher and air consumption is lower than compared to mode 2 per hour of usage.
2	Short cycle oxidation testing	Fuel consumption is lower and air consumption is higher than compared to mode 1 per hour of usage,

6. How often does the system operate? Can you estimate the number of hours per typical week, month or year? If there are different operating modes listed under Question 5 estimate the (weekly/monthly/yearly) hours in each operating mode.

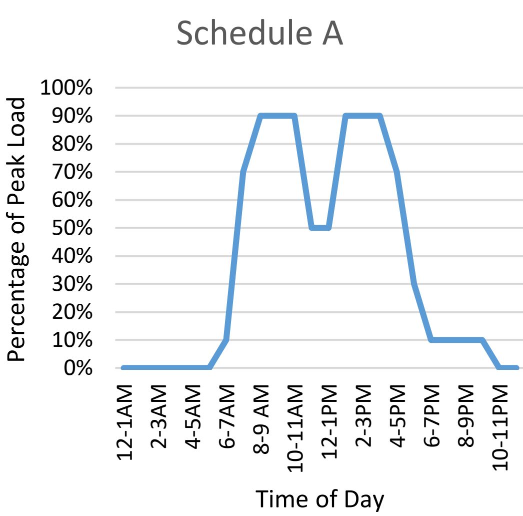
Maximum Rig operation per year is <1200 hrs per year. Test Mode is client dependent and will vary year to year.
Maximum Rig operation in Mode 1 is <1000 Hrs per year
Maximum Rig operation in Mode 2 is <1200 Hrs per year

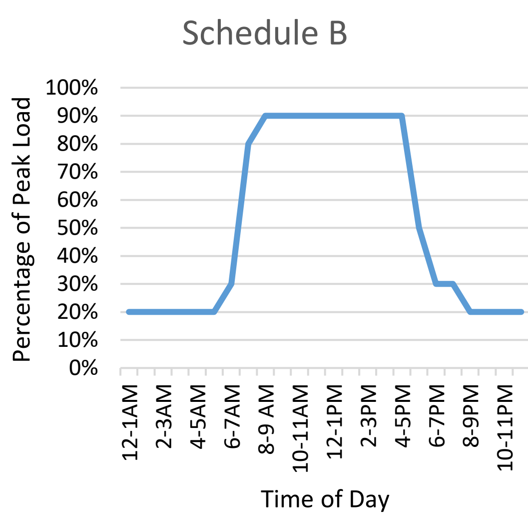
7. For each operating mode listed under Question 5, which components are at peak energy demand and which are at part load. For equipment at part load, indicate the percentage of peak load.

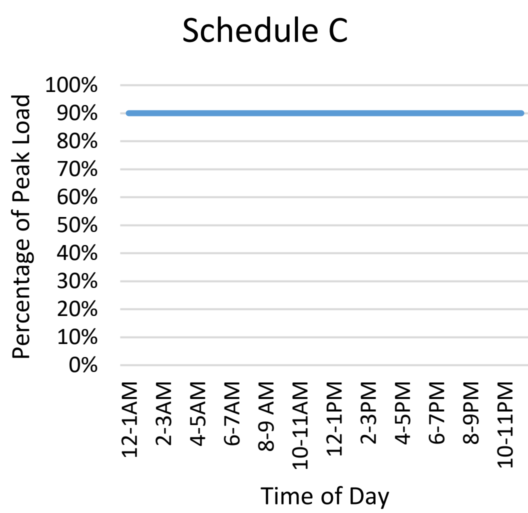
Mode #	**Components at Peak Energy Demand** These components are at or near their nameplate power/energy demand	**Components at Part Load** These components are below their peak operating capacity. Indicate in percentage terms their loading relative to peak capacity
1	Items 1,2,3, 5,and 7 will all be at their peak demand (information on of energy required in section 4)	Item 4 will be running at ~85% peak capacity while item 6 will be at 30-40% of peak capacity.
2	Items 2,3,4 5, and 7 will all be at their peak demand (information on of energy required in section 4)	Item 1 will be running at ~85% peak capacity while item 6 will be running at ~50% peak capacity.

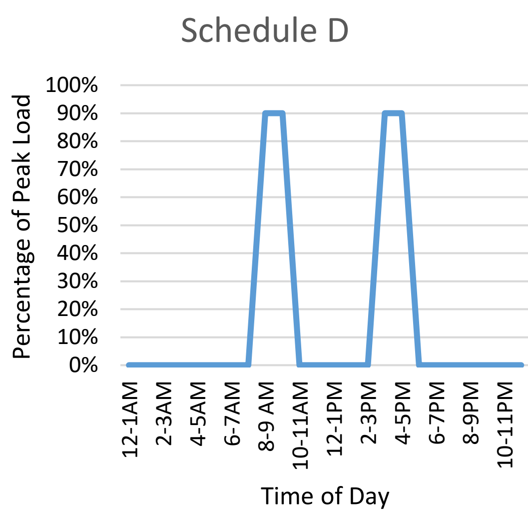
8. Overall does one of the four operating profiles shown below represent typical operation? If none apply, can you modify one to suit how the equipment operates. Alternatively, describe the operating profile?

Schedule B is most representative. Burner Rig run time varies between 8 hour and 24 hour blocks depending on several variables.









Other

9. Are there plans to upgrade or replace this system or components soon? Are there ideas or plans to improve the efficiency of this system already in place?

Additional automation to shut down the air compressor when the burner rig shuts down is being implemented as the compressor consumes ~90 KJ/s at idle. Compressor hours have previously been 1.5X to 2X compared to rig operation hours.

10. Do you have any other comments or information relevant to the operation or operating energy of this piece of equipment?

Items 4, 5, 6, and 7 are common to both burner rigs. Item 4 is affected when both rigs are running at the same time. Both rigs operating at the same time has occurred less than 50% of the time based on historical usage from the past decade.

D.1 PROCESS LOAD QUESTIONNAIRE – BURNER RIG 2

PROCESS-PLUG LOAD QUESTIONNAIRE

Purpose

The purpose of this questionnaire is to understand the unique process-plug loads present in your facilities. This document along with discussions with the users will inform a more detailed process-plug load data sheet.

Why are process loads important?

Process-plug loads can represent a significant portion of building energy use. For high performance buildings, this portion can approach 50% of total building energy use. By understanding the operating characteristics accurately these energy uses will be more accurately represented in the building energy model.

System Name: Burner Rig 2

RDS Reference(s): RDS-021-1, RDS-023-1
Space ID(s): 3.13, 3.15
Quantity: 1
Documents Reviewed:

- 2020 09 15 - Room Data Sheet V5.xlsx
  - RDS-021-1, RDS-023-1
- 4-04-001 TSTS Equipment List (V3.15).xlsx
- NRC Burner Rigs 1 and 2.pptx

General Information

11. Please provide a brief narrative describing the overall system. In other words what does the system do?

System subjects new jet engine materials, coating, and/or components to a representative hostile (high temperature, high velocity, etc) environment found inside turbine engines.

12. What are the major components of the system? In the table below, list and describe the major energy consuming components and describe their function. Add new rows if needed.

Item #	**Component of System** Name of the individual component or sub-system	**Description** Describe the function of the component
1	Combustor	Burner rig served by the air manifold and supported on the combustor stand.
2	Control Console	Electronic control unit
3	Room Exhaust	Room exhaust system capable of removing up to 10000 CFM

Item #	Component of System Name of the individual component or sub-system	Description Describe the function of the component
4	Compressed Air System	Provides air for the burner rigs to operate.
5	Air Dryer	Removes the moisture from the compressed air by dropping the dew point for testing consistency
6	Electric Air Preheater	Heater for preheating supply air to burner rig
7	Heater Control	Control unit for preheater is integrated into the control system
8	Liquid injection system	Integrated into the burner rig control system
9	Make up air unit	Provides air for the compressor instead of taking it from the building.
10	Fuel pumps (4)	Pump 1 can either provide higher volume (12 GPH), lower pressure fuel (15 PSIG) or lower volume, high pressure fuel (<7.5 GPH @ <200 psig). Pump 2, Pump 3, Pump 4 are fuel transfer pumps in the farm.

Energy Demand

13. What energy sources are required for this system? Indicate the energy sources such as electricity, natural gas, propane, process cooling, jet fuel, etc. required. What is the peak energy demand (sometimes referred to as nameplate) for each energy source?

Item #	Energy Sources List all energy sources such as electricity, natural gas, etc. for each component or system in the above table.	Peak Energy Demand List the peak energy demand in the same order as the energy sources are listed in the column to the left. Indicate units.
1	Liquid fuel, domestic water, gas fuel (NG), compressed air	12 GPH @ 15 PSIG, ½ inch pipe, ~800 CFH, 550 ACFM @ 100 PSIG
2	Electricity	120 AC 20 Amp
3	Electricity	600 V 15 Amp
4	Electricity, cooling water	600 V 400 Amps, 6 L/s
5	Electricity, cooling water	600 V 15 Amps, 1.25 L/s
6	Electricity	75 kW
7	Signal	10 W

Item #	Energy Sources List all energy sources such as electricity, natural gas, etc. for each component or system in the above table.	Peak Energy Demand List the peak energy demand in the same order as the energy sources are listed in the column to the left. Indicate units.
8	Signal	10 W
9	Electricity	600 V 15A
10	Fuel pumps (4)	120 V 15 A each

Heat Rejection

14. Does the system reject heat? If so, how much? is the heat rejected to the room, a dedicated exhaust system or process cooling loop? What is the temperature of the rejected heat (°C)?

Item #	Heat Rejection Indicate the heat rejection for each component or sub-system	Heat Rejection Temperature (°C)	Heat Rejection Medium To ambient space, outdoors, to dedicated exhaust system, to process cooling, other?
1	Burner rig Fuel Source	<1650	<300KJ/s into exhaust plenum that is drawn of the room by an exhaust fan. Room is vented to the outside with variable pitch louvers to chain air flow draw from the room.
2	Console and console controlled devices	<45	< 1.5 KJ/s, typically closer to 1 -1.2 KJ/s during operation. This includes pumps and motors located in the rig room. In control room power <0.6KJ/s
3	Exhaust Fan	Unknown	< 7.5 KJ/s. Unit is located on the exterior of the roof.
4	Air Compressor	<100	Single Burner Rig uses <115 KJ/s. If both rigs are in use < 175 KJ/s. System is water cooled and cooling water on inlet side is >29 C, outlet side can exceed 45 C depending on usage/demand of air compressors and oil heat exchangers. System will shut down if oil temperature reaches 100 C.
5	Air Dryer	<90	Air is cooled to 3 C. S.S use of >7.5 KJ/s. System is Water cooled but no outlet temperature recorded. Will shut down if temperature switch on system reaches 90C.
6	Preheater	<400	<75KJ/s maximum. Preheater shuts down at 400 C. Air can be channeled through the preheater then into the burner rig. The trade-off is reduced Jet fuel consumption. The preheater can heat air that is then dumped into the room and does not offset jet fuel consumption.
7	Heater Control	Unknown / irrelevant	This system is governed by the burner rig console. It is just a control signal that is ~10W
8	Liquid injection system	Unknown / irrelevant	This system is governed by the burner rig console. Use of this system would remove other console powered devices.
9	Make up air unit		<1.5 KJ/s. Unit is located on exterior of building

Item #	Heat Rejection Indicate the heat rejection for each component or sub-system	Heat Rejection Temperature (°C)	Heat Rejection Medium To ambient space, outdoors, to dedicated exhaust system, to process cooling, other?
10	Fuel pumps (4)	Unknown	All pumps are located outside in the fuel farm each pump is <1.5 KJ/s.

Operating Profile

15. Does the system have different operating modes? Name each mode and describe the mode.

Mode #	Operating Mode Name the operating mode	Description Describe what happens during the mode
1	Advanced engine durability testing	Fuel consumption is higher and air consumption is lower than compared to mode 2.
2	Short cycle oxidation testing	Fuel consumption is lower and air consumption is higher than compared to mode 1,
3	Preheated Burner Rig testing	Jet fuel consumption is lower but electricity consumption is higher compared to Mode 1 or 2.
4	Preheated Cooling air Burner Rig Testing	Electricity consumption is increased compared to Mode 1 or 2.
5	Fuel Transfer	Exterior Pumps transfer fuel to required locations during fuel transfers

16. How often does the system operate? Can you estimate the number of hours per typical week, month or year? If there are different operating modes listed under Question 5 estimate the (weekly/monthly/yearly) hours in each operating mode.

Maximum Rig operation per year is <1200 hrs per year. Test Mode is client dependent and will vary year to year.
Maximum Rig operation in Mode 1 is <1000 Hrs per year.
Maximum Rig operation in Mode 2 is <1200 Hrs per year.
Mode 3 operation has not been used in the past decade.
Mode 4 has been used ~ 1000 hours in past decade.
Mode 5 occurs intermittently 15-20 hours a year.

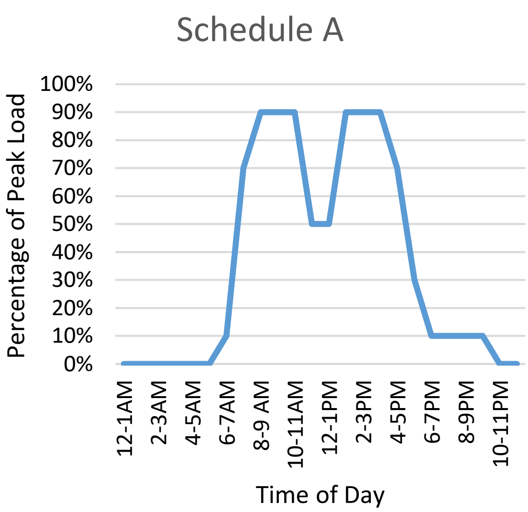
17. For each operating mode listed under Question 5, which components are at peak energy demand and which are at part load. For equipment at part load, indicate the percentage of peak load.

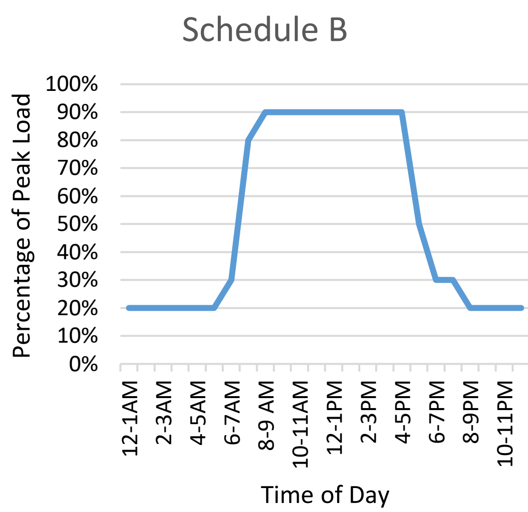
Mode #	Components at Peak Energy Demand These components are at or near their nameplate power/energy demand	Components at Part Load These components are below their peak operating capacity. Indicate in percentage terms their loading relative to peak capacity
1	Items 1, 2, 5, and 10(1)) will all be at their peak demand (information on of energy required in section 4)	Item 3 will run at 60-95% of peak capacity depending on ambient temperature and coupon type due to the variable control setup of the system. Item 4 and item 9 will run at ~85% and 30-40% of peak capacity, respectively. Item 10(2,3,4)= 0% (fuel transfers are not conducted during operation of rig)

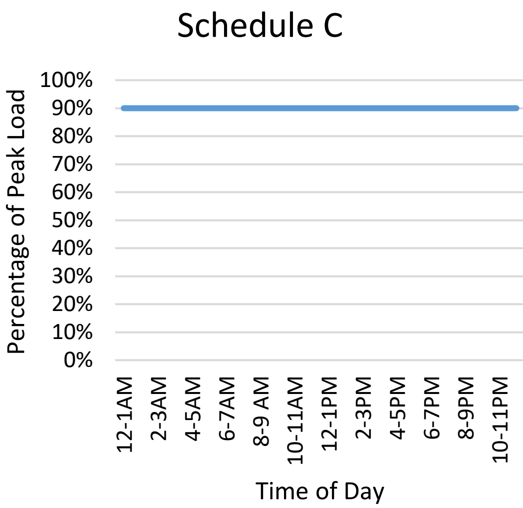
Mode #	**Components at Peak Energy Demand** These components are at or near their nameplate power/energy demand	**Components at Part Load** These components are below their peak operating capacity. Indicate in percentage terms their loading relative to peak capacity
2	Items 2, 4 5, and 10(1) will all be at their peak demand (information on of energy required in section 4)	Item 3 will run at 60-95% of peak capacity depending on ambient temperature and coupon type due to the variable control setup of the system. Item 1 and item 9 will run at ~85% and 30-50% of peak capacity, respectively. Item 10(2,3,4)= 0% (fuel transfers are not conducted during operation of rig)
3	Items 2, 4, 5, 6, and 10(1) will all be at their peak demand (information on of energy required in section 4)	Item 3 will run at 60-95% of peak capacity depending on ambient temperature and coupon type due to the variable control setup of the system. Item 1 and item 9 will run at 60-85% and 30-50% of peak capacity, respectively. Item 10(2,3,4)= 0% (fuel transfers are not conducted during operation of rig)
4	Items 1, 2, 3, 4, 5, and 10(1) will all be at their peak demand (information on of energy required in section 4)	Item 9 is @ 30-50% of max Item 10(2,3,4)= 0% (fuel transfers are not conducted during operation of rig)
5	Item 10 (2,3,4)	Items 1, 2, 3, 4, 5, 6, 9, and 10(1) = 0%

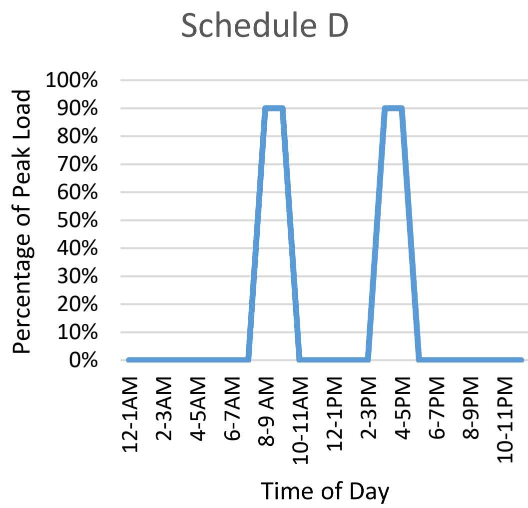
18. Overall does one of the four operating profiles shown below represent typical operation? If none apply, can you modify one to suit how the equipment operates. Alternatively, describe the operating profile?

Schedule B is most representative. Burner Rig run time varies between 8 hour and 24 hour blocks depending on several variables.
Schedule D would be applicable for fuel transfers.









<u>Other</u>

19. Are there plans to upgrade or replace this system or components soon? Are there ideas or plans to improve the efficiency of this system already in place?

Additional automation to shut down the air compressor when the burner rig shuts down is being implemented as the compressor consumes ~90 KJ/s at idle. Compressor hours have previously been 1.5X to 2X compared to rig operation hours.

20. Do you have any other comments or information relevant to the operation or operating energy of this piece of equipment?

Items 4, 5, 9, and 10 are common to both burner rigs. Item 4 is affected when both rigs are running at the same time. Both rigs operating at the same time has occurred less than 50% of the time based on historical usage from the past decade.

E.1 PROCESS LOAD QUESTIONNAIRE – HEAT TREATMENT AND COATINGS LAB

PROCESS-PLUG LOAD QUESTIONNAIRE

Purpose

The purpose of this questionnaire is to understand the unique process-plug loads present in your facilities. This document along with discussions with the users will inform a more detailed process-plug load data sheet.

Why are process loads important?

Process-plug loads can represent a significant portion of building energy use. For high performance buildings, this portion can approach 50% of total building energy use. By understanding the operating characteristics accurately these energy uses will be more accurately represented in the building energy model.

System Name: Heat Treatment and Coatings Lab

RDS Reference(s): RDS-018-1, RDS-025-1, RDS-031-1
Space ID(s): 3.10, 3.17, 3.23
Quantity:
Documents Reviewed:

- 4-04-001 TSTS Equipment List (V3.17) - 05 Oct 2020.xlsx

General Information

21. Please provide a brief narrative describing the overall system. In other words what does the system do?

This document will discuss the Cyclic Oxidization furnaces (x4), the Lindburg and carbolite furnaces (x5), and the isostatic furnace (x1)

22. What are the major components of the system? In the table below, list and describe the major energy consuming components and describe their function. Add new rows if needed.

Item #	**Component of System** Name of the individual component or sub-system	**Description** Describe the function of the component
1	Cyclic Oxidation Furnaces (4 in total)	High temperature furnace to characterize oxidation properties of candidate materials.
2	Lindburg (4 in total) and Carbolite (1 in total) Furnaces	High temperature furnaces for heat treatment of candidate materials
3	Hot Isostatic Press	Specialized material processing equipment to apply both high temperature and uniform pressure on candidate materials.

Item #	Component of System Name of the individual component or sub-system	Description Describe the function of the component
4		
5		

Energy Demand

23. What energy sources are required for this system? Indicate the energy sources such as electricity, natural gas, propane, process cooling, jet fuel, etc. required. What is the peak energy demand (sometimes referred to as nameplate) for each energy source?

Item #	Energy Sources List all energy sources such as electricity, natural gas, etc. for each component or system in the above table.	Peak Energy Demand List the peak energy demand in the same order as the energy sources are listed in the column to the left. Indicate units.
1	Electrical power	220 VAC, 60A
2	Electrical power	220 VAC. 40A (4), 220 VAC, 60A (1)
3	Electrical power	600 VAC 3Ph 70A
4		
5		

Heat Rejection

24. Does the system reject heat? If so, how much? is the heat rejected to the room, a dedicated exhaust system or process cooling loop? What is the temperature of the rejected heat (°C)?

Item #	Heat Rejection Indicate the heat rejection for each component or sub-system	Heat Rejection Temperature (°C)	Heat Rejection Medium To ambient space, outdoors, to dedicated exhaust system, to process cooling, other?
1	Some (cyclic) heat is rejected to room	800C	Process cooling water
2	Some heat is rejected to room	150 C	Ambient space
3	Very little heat is rejected to room	80C	Process Cooling Water
4			

Operating Profile

25. Does the system have different operating modes? Name each mode and describe the mode.

Mode #	Operating Mode Name the operating mode	Description Describe what happens during the mode
1	Normal system operation	Furnace is ON and at elevated temperature
2	Normal system operation	Furnace is ON and at elevated temperature
	Normal system operation	Furnace is ON and at elevated temperature

26. How often does the system operate? Can you estimate the number of hours per typical week, month or year? If there are different operating modes listed under Question 5 estimate the (weekly/monthly/yearly) hours in each operating mode.

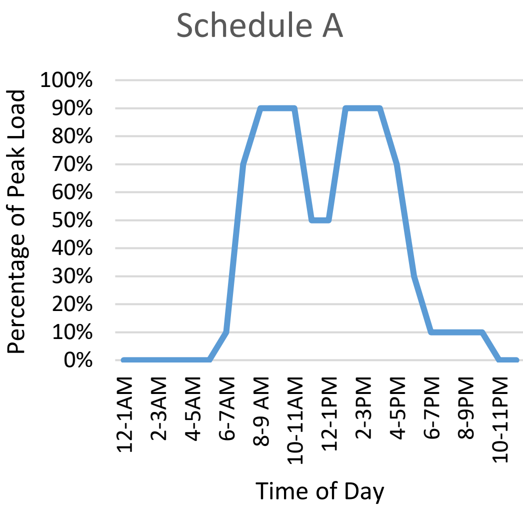
Cyclic furnaces – constant 24/7 up to 15 days / month
Lindburg and carbolite furnaces – constant up to 24/7/365
Isostatic Furnace – 2 days / week, 15 times / year

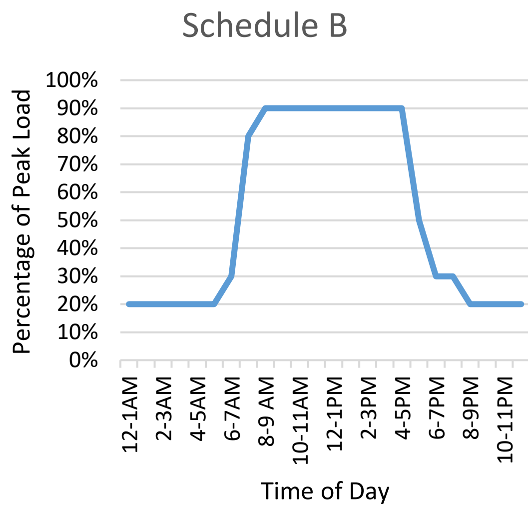
27. For each operating mode listed under Question 5, which components are at peak energy demand and which are at part load. For equipment at part load, indicate the percentage of peak load.

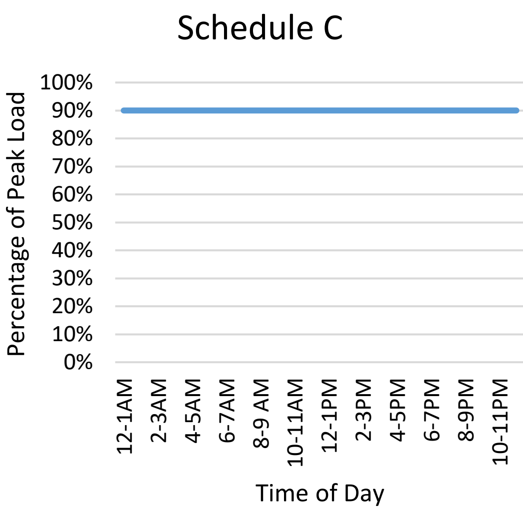
Mode #	Components at Peak Energy Demand These components are at or near their nameplate power/energy demand	Components at Part Load These components are below their peak operating capacity. Indicate in percentage terms their loading relative to peak capacity
1	Items 1 through 3 while operating	
2		
3		

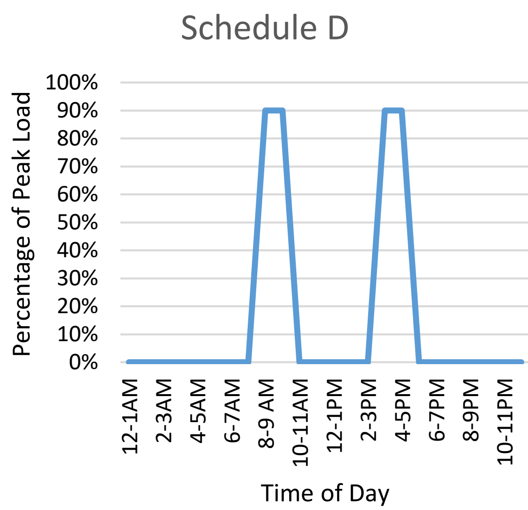
28. Overall does one of the four operating profiles shown below represent typical operation? If none apply, can you modify one to suit how the equipment operates. Alternatively, describe the operating profile?

Cyclic Oxidization Furnaces – Schedule A for the duration of operation (24/7)
LIndburg and Carbolite Furnaces – Schedule B for the duration of operation (24/7)
Isostatic Furnace – Schedule B for the duration of operation (24/7)









Other

29. Are there plans to upgrade or replace this system or components soon? Are there ideas or plans to improve the efficiency of this system already in place?

There are no plans to upgrade any of the equipment discussed here.

30. Do you have any other comments or information relevant to the operation or operating energy of this piece of equipment?

No

F.1 PROCESS LOAD QUESTIONNAIRE – HIGH TEMPERATURE MATERIALS TESTING

PROCESS-PLUG LOAD QUESTIONNAIRE

Purpose

The purpose of this questionnaire is to understand the unique process-plug loads present in your facilities. This document along with discussions with the users will inform a more detailed process-plug load data sheet.

Why are process loads important?

Process-plug loads can represent a significant portion of building energy use. For high performance buildings, this portion can approach 50% of total building energy use. By understanding the operating characteristics accurately these energy uses will be more accurately represented in the building energy model.

System Name: HTM Testing

RDS Reference(s): RDS-017-1. RDS-020-1, RDS-044-1
Space ID(s): 3.9, 3.12, 4.9
Quantity:
Documents Reviewed:

- 4-04-001 TSTS Equipment List (V3.17) - 05 Oct 2020.xlsx

General Information

31. Please provide a brief narrative describing the overall system. In other words what does the system do?

Multiple furnaces and hydraulic testing systems for testing high temperature materials.

32. What are the major components of the system? In the table below, list and describe the major energy consuming components and describe their function. Add new rows if needed.

Item #	**Component of System** Name of the individual component or sub-system	**Description** Describe the function of the component
1	Induction Heaters (8 in total) NOVA STAR 7 7.5KW HEATER,1YR NOVA STAR 5 5 KW HEATER Easy heat 5060	Heater, induction type, used to apply high temperature to specimen. These are in two parts. The head has the coil attached to it that generates the heating induction. The rack mounted controller manages the command signal and preconditions the head electrical power. These require clean process water for cooling. Connected directly to wall twist lock plug.
2	Furnaces – Box (5 in total), Clam shell (9 in total), and slide-type igniter (3 in total)	High temperature furnaces, used in load frame, to heat specimens. These are not water cooled. These are controlled with smaller controllers

Item #	Component of System Name of the individual component or sub-system	Description Describe the function of the component
		and are connected directly to wall twist lock plug. These are interchangeable between load frames, depending on test and specimen requirements.
3	VACUUM FURNACE,BARBER COLEMAN MODEL IR77,INFRARED	High temperature vacuum chamber. The chamber is water cooled with clean process water and is controlled with a dedicated rack having temperature and vacuum controllers. Connected directly to wall twist lock plug.
4	Hydraulic Load Frames (18 in total)	Hydraulic load frames are used to apply dynamic loads to specimens. The test frame controllers are located in rack and are interfaced via computer.
5	UPS 130KVa Liebert	Large UPS to supply 600, 485, 115 VAC. Supply power to load frame controller, pc, heating solution, hydraulic and cooling supply. Unit is fed by emergency power and normal power.
6	Ceramic Matrix Composite (CMC) High Temperature Furnace with 3 point bending test fixture	Large, very high temperature furnace for testing CMC material. Dedicated rack for controller. Furnace requires clean process water cooling. Connected directly to wall, twist lock plug.
7	Micro-mechanical test frame Taylor Robertson - 78K	Electro-mechanical low capacity load frame. Requires clean process water.
8	Hydraulic pumps (2)	Hydraulic power supply, constant 3000 psi variable flow 10 GPM to 30 GPM.
9	Ultrasonic Power Supply – Branson 2500W (2)	Installed in hydraulic load frame – specialty fatigue testing @ 20,000 Hz. Connected directly to wall, twist lock plug.
10	GRUNDFOS 22 GPM process water pump	Located in service room. Supplies clean cooling water to all (18) hydraulic load frame stations, cools ancillary devices, grips, furnaces and induction heaters. For redundancy (safety) reasons, this system switches to city water if failure occurs.

<u>Energy Demand</u>

33. What energy sources are required for this system? Indicate the energy sources such as electricity, natural gas, propane, process cooling, jet fuel, etc. required. What is the peak energy demand (sometimes referred to as nameplate) for each energy source?

Item #	Energy Sources List all energy sources such as electricity, natural gas, etc. for each component or system in the above table.	Peak Energy Demand List the peak energy demand in the same order as the energy sources are listed in the column to the left. Indicate units.
1	Electricity	Total of 8 – 485 VAC 3Ph, 15 A UPS twist plugs Total of 2 – 485 VAC 3PH, 25 A UPS twist plugs
2	Electricity	(18) Every load frame stations – 115 VAC 1PH 20A UPS twist plugs
3	Electricity	(1) Every two load frame stations – 230VAC 1Ph, 30 A UPS – Twist plug
4	Electricity	(18) Every load frame station – 115 VAC 15A – UPS twist plug (18) Every load frame station – 115 VAC 15A – UPS (monitor, metres, scope)

Item #	Energy Sources List all energy sources such as electricity, natural gas, etc. for each component or system in the above table.	Peak Energy Demand List the peak energy demand in the same order as the energy sources are listed in the column to the left. Indicate units.
5	Electricity	600 VAC 3Ph, 150 A Supplied from generator backup power (Emergency Power) and with selectable 600 VAC 3Ph, 150 A normal power supply
6	Electricity	230 VAC 1Ph, 20 A Twist lock plug
7	Electricity	230 VAC 1Ph, 60 A 115 VAC 1Ph, 15 A
8	Electricity	(2) 600 VAC 3 PH, 100A UPS
9	Electricity	230 VAC 1Ph, 20 A Twist lock plug UPS
10	Electricity	600 VAC 3Ph, 20A UPS

Heat Rejection

34. Does the system reject heat? If so, how much? Is the heat rejected to the room, a dedicated exhaust system or process cooling loop? What is the temperature of the rejected heat (°C)?

Item #	Heat Rejection Indicate the heat rejection for each component or sub-system	Heat Rejection Temperature (°C)	Heat Rejection Medium To ambient space, outdoors, to dedicated exhaust system, to process cooling, other?
1	Some heat is rejected to room	400ºC non insulated specimen	Process clean water cooling– 5.7 L/min @ min 3 Bar for each (10)
2	Significant heat is rejected to room		Ambient space only
3	Very little heat is rejected to room		Process cooling – 5.7 L/min @ min 3 Bar
4	Some heat is rejected to room		water cooled grips (18) 2 L/min @ min 3 bar air pressure line (1/2” line) unknown L/min for high temperature extensometer cooling and also specimen cooling for specialized tests (i.e. thermal-mechanical fatigue tests)
5	Some heat is rejected to room		Ambient space
6	Some heat is rejected to room		Ambient space
7	Some heat is rejected to room		Standalone process water cooler
8	Some heat is rejected to room	45ºC 400ft 1.25” OD pipe	80% of power (120,000 BTU) heat absorbed by Tower water 30 to 50 psi delta at heat exchanger

Item #	Heat Rejection Indicate the heat rejection for each component or sub-system	Heat Rejection Temperature (°C)	Heat Rejection Medium To ambient space, outdoors, to dedicated exhaust system, to process cooling, other?
9	Some heat is rejected to room		Ambient space
10	Very little heat is rejected to room		Ambient space

Operating Profile

35. Does the system have different operating modes? Name each mode and describe the mode.

Mode #	Operating Mode Name the operating mode	Description Describe what happens during the mode
1	Standby	System in idle – all controllers are functional and closing loops but specimen are seeing ambient temperatures.
2	Maximum	System is running – heaters (induction or furnace) are applying elevated temperatures

36. How often does the system operate? Can you estimate the number of hours per typical week, month or year? If there are different operating modes listed under Question 5 estimate the (weekly/monthly/yearly) hours in each operating mode.

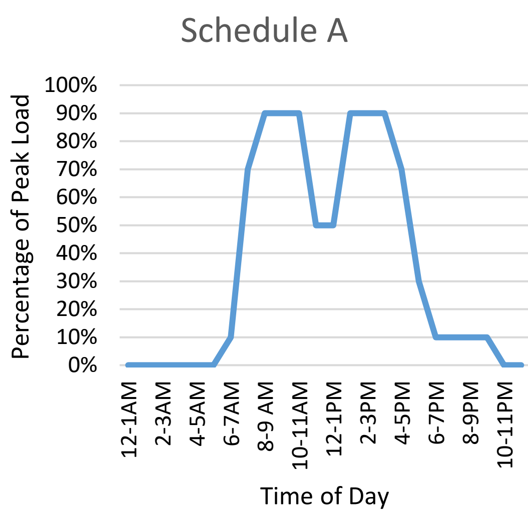
> A minimum load would be all 18 stations, on standby with the system at idle, 24/7. On average, half the stations are running at maximum operating load, 5 days per week 24 hours a day. Low periods could have 4 stations running at maximum operating load, 1 week per month for 24 hours a day. High periods would have 14 stations running at maximum operating load 24/7, 50 weeks/year.

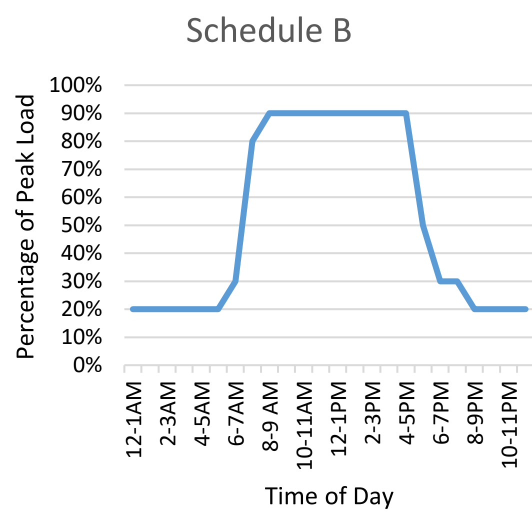
37. For each operating mode listed under Question 5, which components are at peak energy demand and which are at part load. For equipment at part load, indicate the percentage of peak load.

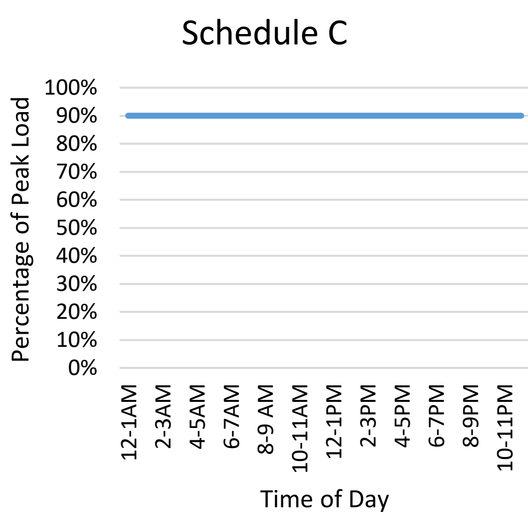
Mode #	Components at Peak Energy Demand These components are at or near their nameplate power/energy demand	Components at Part Load These components are below their peak operating capacity. Indicate in percentage terms their loading relative to peak capacity
1	Load frame station – 80% (does not include heating solution)	Hydraulic pump @ 50%, heating solutions are at rest 5%, Cooling water system is at 50%.
2	Load frame station – 80%, Heating solution 50-85% of nameplate power. Hydraulic pump @ 70%, heating solutions are at rest 65%, Cooling water system is at 100%.	

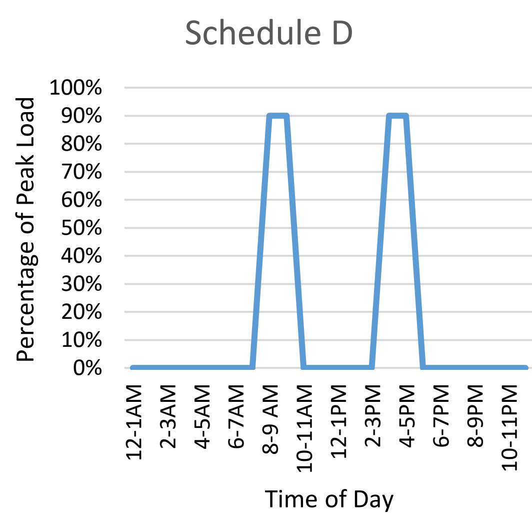
38. Overall does one of the four operating profiles shown below represent typical operation? If none apply, can you modify one to suit how the equipment operates. Alternatively, describe the operating profile?

> Schedule B may be seen for 10 % of the stations during the working week. When we are running at maximum Schedule C is a better representation 24/7.









Other

39. Are there plans to upgrade or replace this system or components soon? Are there ideas or plans to improve the efficiency of this system already in place?

Our current process water system is under sized. Depending on testing requirements in the future, we may or may not have sufficient cooling. Our older hydraulic pump is functioning but we are limited to lower pressures. Both our pumps have auxiliary cooling in order to maintain an oil temperature under 50ºC. Our newer pump seems to run without this added cooling.

40. Do you have any other comments or information relevant to the operation or operating energy of this piece of equipment?

Currently we cannot run certain equipment simultaneously due to our cooling water requirements. A newly designed building should have the services available but not necessarily consumed at all times.

G.1 PROCESS LOAD QUESTIONNAIRE – CENTRAL PROCESS COOLING PLANT

PROCESS-PLUG LOAD QUESTIONNAIRE

Purpose

The purpose of this questionnaire is to understand the unique process-plug loads present in your facilities. This document along with discussions with the users will inform a more detailed process-plug load data sheet.

Why are process loads important?

Process-plug loads can represent a significant portion of building energy use. For high performance buildings, this portion can approach 50% of total building energy use. By understanding the operating characteristics accurately these energy uses will be more accurately represented in the building energy model.

System Name: Central Process Cooling Plant

RDS Reference(s): None.
Space ID(s): None.
Quantity: 1
Documents Reviewed:

- 2020-09-03_2.4.2_TSTS_Prog_Rpt_66_r0.docx

General Information

41. Please provide a brief narrative describing the overall system. In other words what does the system do?

A process cooling water utility will be required to support SMPL Materials Processing and Characterization Equipment. Process cooling water will be supplied through a dedicated piping loop to the NRC High Bay Area, Material and Component Testing Lab, High Pressure Compressed Air Plant and other lab spaces conducting structural integrity and high temperature materials research.

42. What are the major components of the system? In the table below, list and describe the major energy consuming components and describe their function. Add new rows if needed.

Item #	**Component of System** Name of the individual component or sub-system	**Description** Describe the function of the component
1	Cooled Processing Water – High Temperature Materials Testing Facility (M-13 Basement)	Closed loop system provided chilled process water to various MTS equipment (Grips, Induction heaters, hydraulic pump, furnaces, etc) to extract heat and protect vital testing equipment.
2	SEM Chilled Process Loop	Standalone closed loop system providing chilled process water to the two SEMs in M-13

Item #	Component of System Name of the individual component or sub-system	Description Describe the function of the component
3	Bi-Axial Chilled Process Loop	Standalone closed loop system for the Bi-Axial MTS test frame in M-3
4	Spin Rig cooling ring	Cooling ring to cool seals during elevated temperature tests
5	Hot Isostatic Press Cooling	Water to cool system during operation
6	Vacuum Furnace cooling plate	Cools vacuum equipment during elevated temperature tests

Energy Demand

43. What energy sources are required for this system? Indicate the energy sources such as electricity, natural gas, propane, process cooling, jet fuel, etc. required. What is the peak energy demand (sometimes referred to as nameplate) for each energy source?

Item #	Energy Sources List all energy sources such as electricity, natural gas, etc. for each component or system in the above table.	Peak Energy Demand List the peak energy demand in the same order as the energy sources are listed in the column to the left. Indicate units.
1	Electricity / water flow from chiller	3 HP, 575/60/3, 3450 RPM, 3 AMPS Capacity of 22 GPM @ 252 FOOT HEAD 300 PSI
2	Electricity	208/230V 60 Hz 9.9 AMPS water flow of 2-3 GPM through system
3	Electricity	200-230v 60 hz 3 ph FLA 8 with 3.0 hp. System provides up to 4 GPM
4	Currently city water on a temperature controlled actuator	1 GPM water to city drain
5		Requires 15 GPM for cooling
6	Currently on Tower water	Requires 30 GPM for cooling

Heat Rejection

44. Does the system reject heat? If so, how much? is the heat rejected to the room, a dedicated exhaust system or process cooling loop? What is the temperature of the rejected heat (°C)?

Item #	**Heat Rejection** Indicate the heat rejection for each component or sub-system	**Heat Rejection Temperature (°C)**	**Heat Rejection Medium** To ambient space, outdoors, to dedicated exhaust system, to process cooling, other?
1	Heat is transferred from the device into the water	Varies	Ambient space and back into the chilled closed loop heat exchanger
2	Heat is transferred from the device into the water	Unknown	Ambient space and back into the chilled closed loop heat exchanger
3	Heat is transferred from the device into the water	Varies	Ambient space and back into the chilled closed loop heat exchanger
4	Heat is transferred from the device into the water	varies	City cooling water
5	Heat is transferred from the device into the water	Varies	Ambient space and process cooling water
6	Heat is transferred from the device into the water	varies	Ambient space and process cooling water

Operating Profile

45. Does the system have different operating modes? Name each mode and describe the mode.

Mode #	**Operating Mode** Name the operating mode	**Description** Describe what happens during the mode
1	Normal System Operation	System is cooling all components
2		

46. How often does the system operate? Can you estimate the number of hours per typical week, month or year? If there are different operating modes listed under Question 5 estimate the (weekly/monthly/yearly) hours in each operating mode.

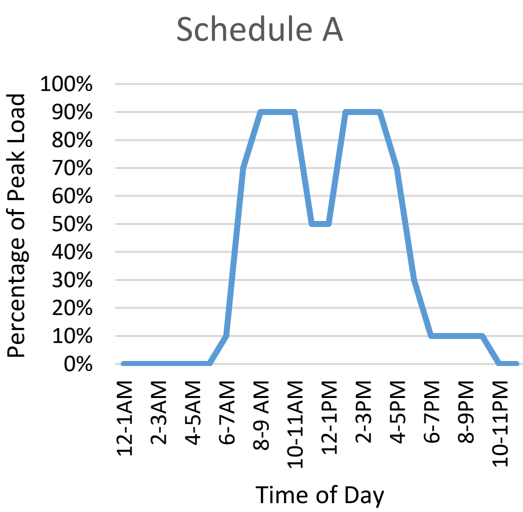
Item 1 – Constant operation 24 hours per day, 7 days a week and 365 days per year
Item 2 - Constant operation 24 hours per day, 7 days a week and 365 days per year
Item 3 – < 1000 Hrs per year
Item 4 - < 1000 Hrs per year
Item 5 - < 1000 Hrs per year
Item 6 - < 1000 Hrs per year

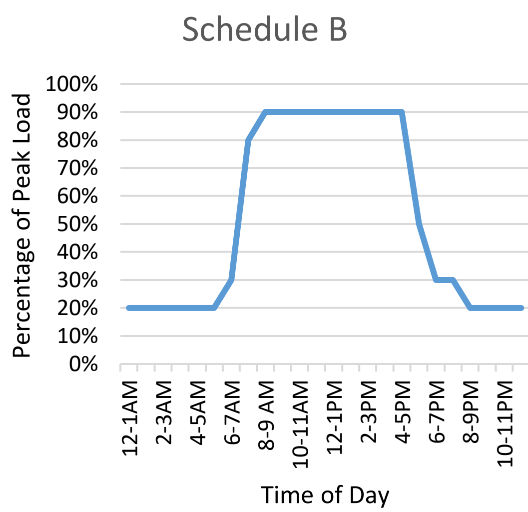
47. For each operating mode listed under Question 5, which components are at peak energy demand and which are at part load. For equipment at part load, indicate the percentage of peak load.

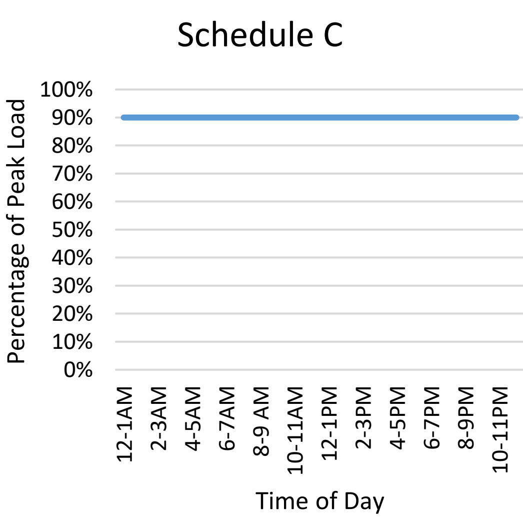
Mode #	Components at Peak Energy Demand These components are at or near their nameplate power/energy demand	Components at Part Load These components are below their peak operating capacity. Indicate in percentage terms their loading relative to peak capacity
1	Items 1 through 6 while operating	
2		

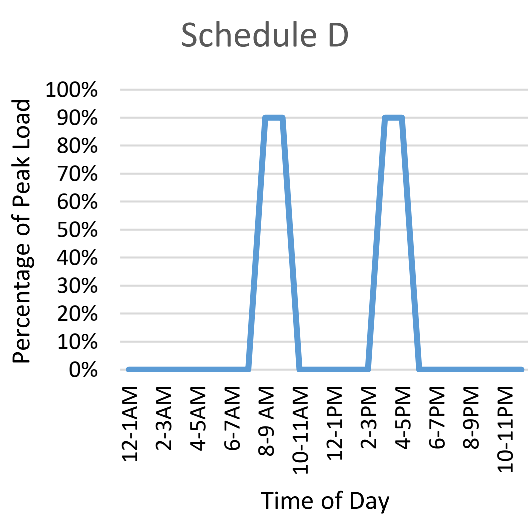
48. Overall does one of the four operating profiles shown below represent typical operation? If none apply, can you modify one to suit how the equipment operates. Alternatively, describe the operating profile?

Schedule C









Other

49. Are there plans to upgrade or replace this system or components soon? Are there ideas or plans to improve the efficiency of this system already in place?

A new chilled process water system to provide sufficient cooling for all components mentioned above to consolidate all process cooling requirements into a single source.

50. Do you have any other comments or information relevant to the operation or operating energy of this piece of equipment?

No

Appendix L GLOSSARY

Glossary

Adjacencies – Primary

Primary adjacency is a connection that is directly adjacent to and connected with the program space - shares a common wall or door.

Adjacencies – Secondary

Secondary adjacency is a connection by corridor or from another room that is near to the program space.

Adjacencies – Tertiary

Tertiary adjacency is a connection by corridor and accessible within a reasonable distance to the program space.

Circulation Space

Space allowed for movement of personnel between workstations. It includes the space for access to support space and building services.

Common-use Area

Area commonly used or shared by clients and/or the public they serve.

General Administrative Offices

Offices that accommodate general office functions and activities that do not require special security or other special features. General administrative offices do not have high interface with the public. These offices comprise the majority of PWGSC office space occupied by client departments and agencies.

Public Zone

Where the public has unimpeded access and generally surrounds or forms part of a government facility.

Quasi-judicial Offices

Offices that accommodate adjudicative or legislative functions. They often require confidentiality or enhanced security and are used by organizations that interpret and administer legislation and regulations, conduct inquiries and hearings and/or perform adjudication functions on complaints, appeals and claims. Functions and operations may include, but are not limited to:

- **Management:** adjudicative body operates separately from the administrative unit which provides service to the adjudicative body;

- **Meetings**: conducted on a scheduled basis with internal staff and members of the public; and
- **Secure and confidential courtroom/hearing room space:** physical protection of staff could be required.

Reception Zone

Where the transition from a public zone to a restricted-access area is demarcated and controlled.

Shared Client Space

Space that is shared by multiple clients / tenants but not accessible to the general public.

Special Purpose Space

Additional, non-standard areas required by a client department to accommodate specific activities that are unique and essential to departmental programs. Examples of special purpose spaces are: laboratories, health units or clinics, meeting or training complexes which serve outside groups, interview rooms, inspection rooms, processing space, departmental libraries (e.g. Department of Justice libraries), gymnasiums, warehouses (e.g. PWGSC's Seized Property Management Directorate's warehouse space), very large file or storage areas (e.g. Canada Revenue Agency's (CRA) tax return storage, Library and Archives Canada storage) other than those allowed by the Workplace 2.0 Fit-up Standards, trade shops, large mail rooms (CRA's mailroom), cash offices or similar spaces requiring special service and security features; and hearing rooms.

Support Space

Spaces for office support functions not included in the workstation or circulation space, but necessary for office operation. Support space includes meeting rooms, quiet rooms, collaborative spaces, kitchenettes, shared equipment areas, printer stations, reception/waiting areas, and other areas as described in Section A3.4 of the Workplace 2.0 Fit-up Standards.

TSB or TSTS Workplace

Space that is accessible by a singular tenant / client. In these spaces, there can be varying degrees of secured areas, SPS and the office space.

Workstation

Workspace provided for an FTE or non-FTE and his/her directly associated furniture and equipment.

Appendix M PROTECTED B "RDS INPUT DOCUMENT"

APPENDIX M - RDS INPUT DOCUMENT

May 21 2021

The Protected B "RDS Input Document" is available by request from the LabCanada Security Team.

Appendix N SOA CALCULATOR AND TYPOLOGIES

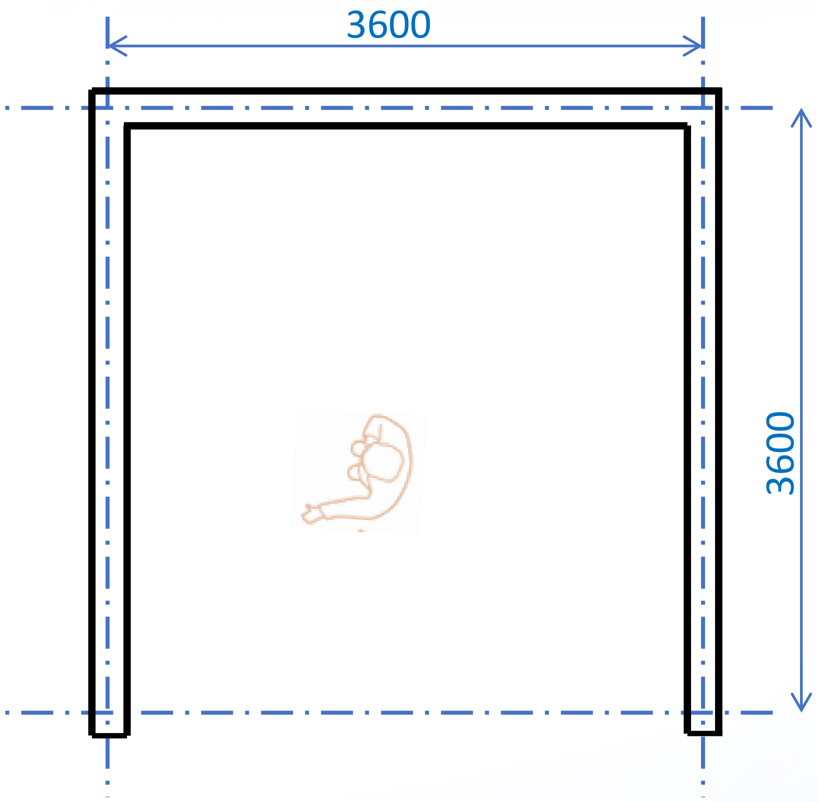
TSTS - Science Office Calculator								
	Space Types		Avg Size (SQM)	Qty	Area (SQM)	Reduction Factor	Actual Seats	Net Area (SQM)
Individual Workpoints	Shared Science Focus Room		7.5	7	52.5	1	7	52.50
	Open Office Work point (2 person per module)		6.48	66	427.68	1	66	427.68
	Open Office Work point (3 person per module)		4.32	0	0	1	0	0.00
	Hot Desk (4 preson per module)		3.24	8	25.92	0.48	3.84	12.44
	Enclosed Workstation (Trans. Safety, Matls Perf.)		9.72	14	136.08	1	14	136.08
	Enclosed Workstation (Trans. Safety, Matls Perf.)		12.96	2	25.92	1	2	25.92
	Tota Net Area (SQM) Individual Workpoints	**# of Seats**		**97**	**668.1**		**92.84**	**654.62**
Collaborative Workpoints	Chat Point	3	0.59m2 / person		57.82		Approx. **32**	
	Huddle	4						
	Teaming Area	10						
	Lounge	10						
	Phone booth	1	4.32	6	25.92		6	
	Small Meeting Room	4	16.2	0	0		0	
	Lab Project Room (2 modules = 3.6x7.2)	6	25.92	3	77.76		18	
	Medium Meeting Room	8 to 12	32.4	2	64.8		24	
	Large Meeting Room	12 to 20	64.8	2	129.6		40	
	Extra Large Meeting Room	80	194.4	0	0		0	
	Tota Net Area (SQM) Collaborative Spaces				**355.9**		**88**	**355.90**
Support Spaces	Kitchenette (5m2/25 person)				19.6			
	Equipment (10m2/25 person)				39.2			
	Lockers (0.5m2/person unassigned)				49			
	Storage		N/A	Combined with Equipment	0			
	Telecom		N/A	Separate Area Allocation	0			
	Custom / Other				0			
	Total Net Area Support Spaces				**107.8**		**181**	**107.80**
	Total Net Area (SQM) all spaces				**1131.8**			**1,118.32**

Science Office Programming

Lab Office Typology - Catalog

Using the 3.6 laboratory module for the basis of space typologies

- Type 2A- Shared Science Focus Room A – 9.72sm
  Enclosed Room
- Type 2B- Shared Science Focus Room B – 12.44sm
  Enclosed Room
- Type 3- Open Workstation - 6.48sm
- Type 4 - Hot Desk – 3.24sm



Science Office Programming

Lab Office/Suite Typology

Description: **Type 2A** – Enclosed Focus Room

- Enclosed Room with demountable partitions for future flexibility. Allows to mid to long term focused work.
- Glazed partitions, if used, to allow light penetration but frosted to provide visual privacy
- Includes worksurfaces to support focus work
- Minimal space for personal materials and files that cannot be filed away into a shared storage room on a daily basis.

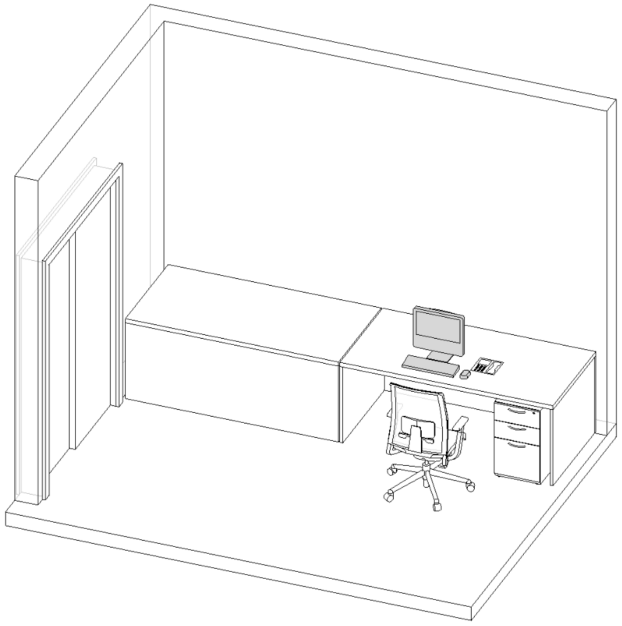
Occupants : 1
Visual Privacy: High
Secure Privacy: High
Audible Privacy: >STC45

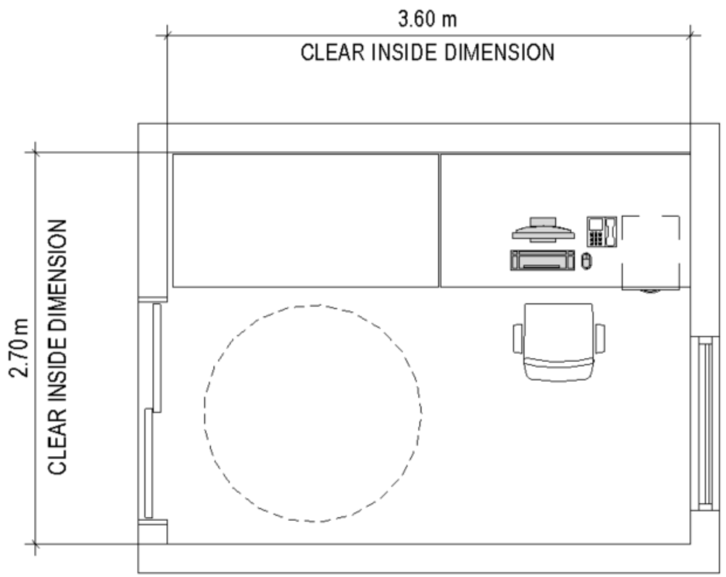
Size: 9.72 sm

Posture: Formal or Casual

IT Profile:

- Power and USB Charging
- VoIP
- LAN drop
- Fiber Drop from LIM





FRAMEWORK

Science Office Programming

Lab Office/Suite Typology

Description: **Type 2B** – Enclosed Focus Room

- Enclosed Room with demountable partitions for future flexibility. Allows to mid to long term focused work.
- Glazed partitions, if used, to allow light penetration but frosted to provide visual privacy
- Includes worksurfaces to support focus work
- Minimal space for personal materials and files that cannot be filed away into a shared storage room on a daily basis.

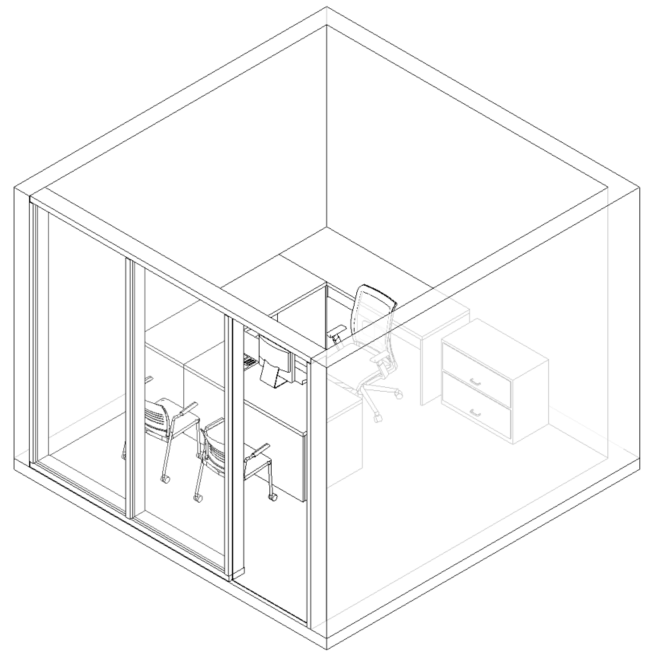
Occupants : 1
Visual Privacy: High
Secure Privacy: High
Audible Privacy: >STC45

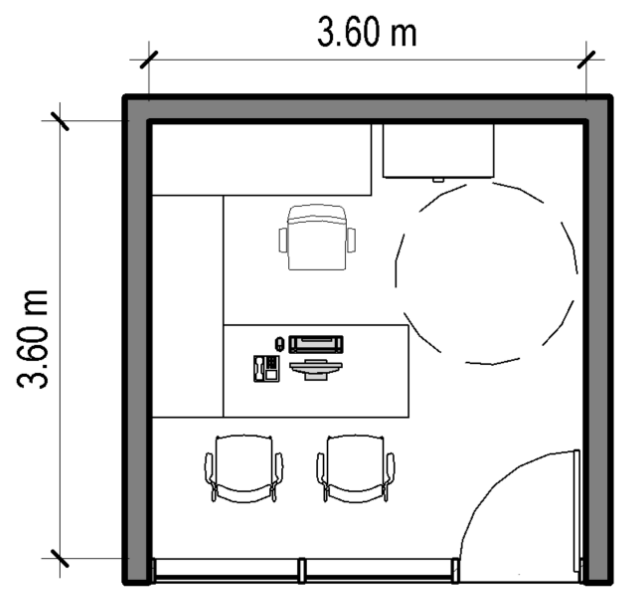
Size: 12.96sm

Posture: Formal or Casual

IT Profile:

- Power and USB Charging
- VoIP
- LAN drop
- Fiber Drop from LIM





Science Office Programming

Lab Office Typology

Description: **Type 3** –Cubicle located in office suite or neighbourhood zone

- Mid to long term workstation. Supports individual focus with adequate layout space for reading, writing, researching.
- Could include sit/stand furniture options, with or without return surface
- Panels not to exceed 54" high
- Includes monitor arm(s) to free up work-surface and optional day storage (secure files).

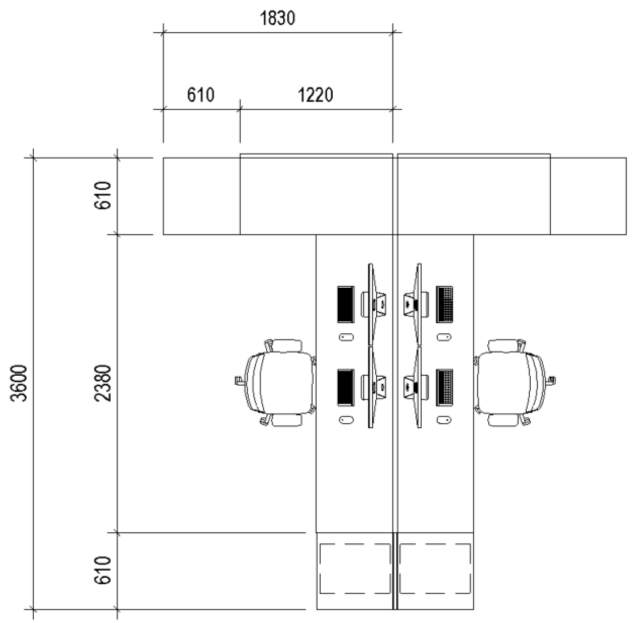
Occupants : 1 per cubicle
Visual Privacy: Low-medium
Secure Privacy: Low
Audible Privacy: Low

Size: 6.48sm / person

Posture: Formal

IT Profile:

- 2 or 3 x 23" monitors
- Power and USB Charging
- VoIP
- LAN drop
- Fiber Drop from LIM



Science Office Programming

Lab Office Typology

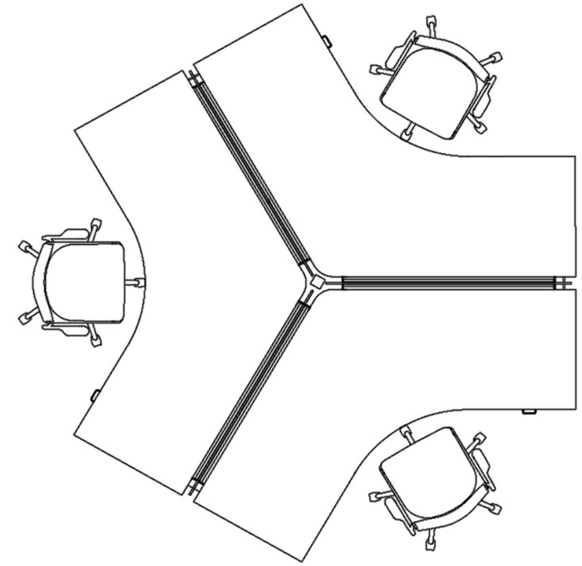
Description: **Type 4** – Hot Desk
- Short-term workstation. Short-term landing point between other “primary” activities.
- Could include sit/stand furniture options, with or without return surface
- Panels not to exceed 54” high
- Includes monitor arm(s) to free up work-surface and optional day storage (secure files).

Occupants : 2
Visual Privacy: Low-medium
Secure Privacy: Low
Audible Privacy: Low

Size: 3.24sm / person

Posture: Formal

IT Profile:
- 2 x 23” monitors
- Power and USB Charging
- VoIP
- LAN drop
- Fiber Drop from LIM



Science Office Programming

Science Collaboration Space

OCCUPANTS: **10+** (Calculate occupancy at 25%)

VISUAL PRIVACY: **Low**

ACOUSTIC PRIVACY: **Low**

AVERAGE SIZE: **20m²**

POSTURE: **Casual**

IT PROFILE:
- **Power & USB charging**
- **75" or 65" monitor**
- **Wireless Presentation**

EXAMPLE: Lounge

OCCUPANTS: **6** (Calculate occupancy at 25%)

VISUAL PRIVACY: **Low-Medium**

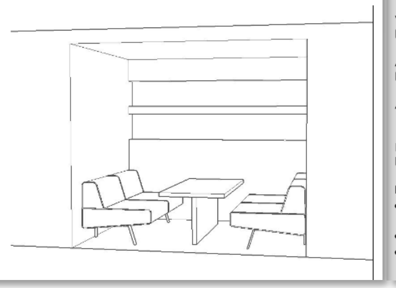
ACOUSTIC PRIVACY: **Low-Medium**

AVERAGE SIZE: **8m²**

POSTURE: **Formal or Casual**

IT PROFILE:
- **Power & USB charging**
- **Optional large monitor display**
- **LAN connection**

EXAMPLE: Huddle



OCCUPANTS: **8** (Calculate occupancy at 25%)

VISUAL PRIVACY: **Low-Medium**

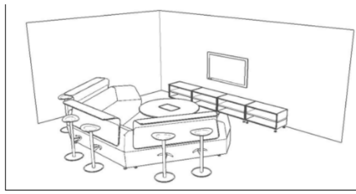
ACOUSTIC PRIVACY: **Low-Medium**

AVERAGE SIZE: **15m²**

POSTURE: **Formal or Casual**

IT PROFILE:
- **Power & USB charging**
- **1 x 50" monitor**
- **Wireless presentation**

EXAMPLE: Teaming Area



OCCUPANTS: **4** (Calculate occupancy at 25%)

VISUAL PRIVACY: **Low**

ACOUSTIC PRIVACY: **Low**

AVERAGE SIZE: **3m²**

POSTURE: **Formal or Casual**

IT PROFILE:
- **Power & USB charging (optional)**

EXAMPLE: Chat Point

OCCUPANTS: **1** (Not included in occupancy calculation)

VISUAL PRIVACY: **Medium-High**

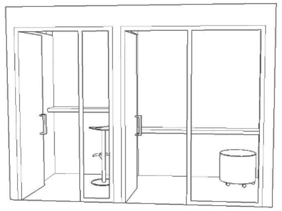
ACOUSTIC PRIVACY: **Medium-High (STC 45)**

AVERAGE SIZE: **5m²**

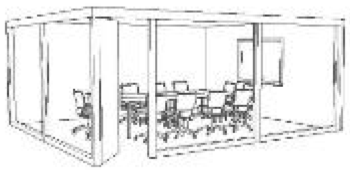
POSTURE: **Formal or Casual**

IT PROFILE:
- **Power & USB charging**
- **VoIP**
- **LAN drop**
- **Optional 1 x 23" monitor (for VC)**

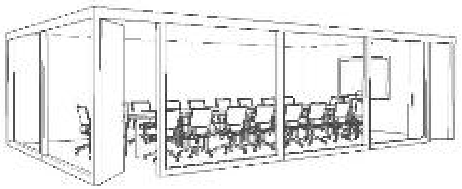
EXAMPLE: Phone Booth



Science Meeting Rooms



MEDIUM MEETING ROOM
Enclosed meeting room for up to **12** people



LARGE MEETING ROOM
Enclosed meeting room for up to **20** people

Science Office Programming

Science Project Room – Collaboration Space

OCCUPANTS: **6**
(Calculate occupancy at 50%)

VISUAL PRIVACY:
Medium-High

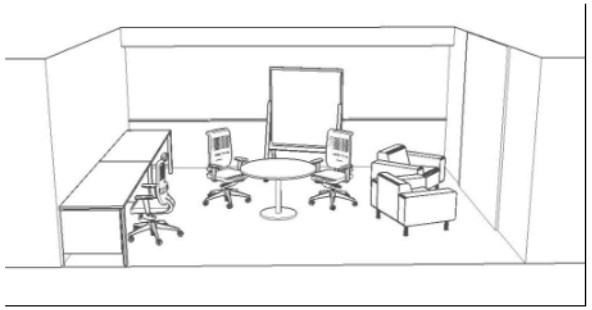
ACOUSTIC PRIVACY:
Medium (STC 45)

AVERAGE SIZE:
$20m^2$

POSTURE:
Formal or Casual

IT PROFILE:
- **Power & USB charging**
- **1 x 70" interactive monitor**
- **Videoconferencing**
- **Teleconferencing**
- **Wireless presentation**
- **Cable matrix**
- **LAN drop**

EXAMPLE: Project Room



- **Integral to Lab Zone**
- **Defined as COLLABORATIVE SPACE**
- **Maybe part of Lab Entry**
- **3.6 X 7.2 = 25.92 m2**

Appendix O GROSS AREA TABLES – INDOOR REQUIREMENTS

GROSS AREAS SUMMARY TABLE BASELINE - OPTION 1				
	Room/Space Name	**Net Area Functional in SQM - Baseline Option**	**Grossing Factor**	**Gross Area Functional in SQM - Baseline Option**
SCIENCE SPACES + SCIENCE SUPPORT	Science and High bay Laboratories	2,850.00	1.25	3,562.50
	Science Workshops	888.78	1.85	1,644.24
	Science Laboratories	3,151.94	1.85	5,831.09
	Science Laboratory Support	655.78	1.85	1,213.19
	Science Logistics	162.16	1.85	300.00
	Sub-Total Science Spaces + Science Support	**7,708.66**		**12,551.02**
NON SCIENCE SPACES SOA	SOA - Individual Workspaces	654.62	1.65	1,080.13
	SOA - Collaboration Workpoints	355.90	1.65	587.24
	SOA - Support Spaces	107.80	1.65	177.87
	Sub-Total Non-Science Spaces	**1,118.32**		**1,845.23**
TSB HO	GCWorkplace - Individual Workspaces	463.00	1.65	763.95
	GCWorkplace - Collaboration Workpoints	377.00	1.65	622.05
	GCWorkplace - Support Spaces	128.00	1.65	211.20
	Executive Suite - Chair, Board Member + COO	208.00	1.65	343.20
	Special Purpose Spaces	216.00	1.65	356.40
	Sub-Total TSB HO	**1,392.00**		**2,296.80**
BASE BUILDING INFRASTRUCTURE	Entrance/Lobby	150.00	1.65	247.50
	Reception	25.00	1.65	41.25
	Waiting Area	25.00	1.65	41.25
	Security Area	35.00	1.65	57.75
PUBLIC ENGAGEMENT	Display - Interpretative Centre	25.00	1.65	41.25
	Informal Gathering/Event Space	150.00	1.65	247.50
	Universal Accessible Washroom	12.00	1.65	19.80
	Sub-Total Public Spaces	**422.00**		**696.30**
SHARED TSTS +TSB HO	Wellness Room/Nursing Room/First Aid	24.00	1.65	39.60
	Centralized Resource Centre	270.00	1.65	445.50
	Sub- Total Shared TSTS + TSB HO	**294.00**		**485.10**
SHARED TSTS	Lunchroom	52.00	1.65	85.80
	Auditorium	235.00	1.65	387.75
	Storage Room for auditorium	13.20	1.65	21.78
	A/V Control Room	19.00	1.65	31.35
	Auditorium Kitchennette Support	20.00	1.65	33.00
	Decentralized Resource Centre	45.00	1.65	74.25
	Server / Computer Room	57.00	1.65	94.05
	Sub-Total Client Shared TSTS	**441.20**		**727.98**
	Sub Total Public Spaces and Client Shared Spaces	**1,157.20**		**1,909.38**
	Total Indoor Building Requirements	**11,376.18**		**18,602.43**