

EC + DFO – Co-Location at FWI

For:
Environment Canada & Department of Oceans and Fisheries
Fresh Water Institute (FWI)
Winnipeg, Manitoba
Project No. R.075255

Prepared by:
Coupland Kraemer Architecture + Interior Design Inc.

February 13, 2017



Table of Contents

1.0 Introduction

1.1 Executive Summary	3
1.2 Freshwater Institute (FWI).....	6
1.3 Environment Canada (EC)	7
1.4 Department of Fisheries and Oceans (DFO)	8

2.0 General Narrative Description

2.1 Design Intent	9
2.2 Security	9
2.3 Sustainable Design.....	10
2.4 Preliminary AHJ, Codes, Regulations & Standards.....	11
2.5 Site Design	12

3.0 Architectural Technical Requirements

3.1 General Requirements.....	14
3.2 Existing Conditions.....	14
3.3 Masonry & Metals	15
3.5 Wood, Plastics and Composites.....	15
3.6 Thermal and Moisture Protection	16
3.7 Openings	17
3.8 Finishes	18
3.9 Specialties & Furnishings	21

4.0 Mechanical Technical Requirements

4.1 Site Services	23
4.2 Building Services	23

5.0 Electrical Technical Requirements

5.1 General	33
5.2 Building Services	34

6.0 Parking Requirements

5.1 General	40
-------------------	----

Appendices

APPENDIX A – EC FUNCTIONAL PROGRAM	
APPENDIX B – DFO FUNCTIONAL PROGRAM	
APPENDIX C – BUILDING CAPABILITY REPORT	
APPENDIX D – CLASS D COST ESTIMATE	

1.0 Introduction

1.1 EXECUTIVE SUMMARY

Coupland Kraemer Architecture + Interior Design Inc. (CKAID) provided pre-design services to Public Works and Government Services (PWGSC) to co-locate Environment Canada (EC) and the Department of Fisheries and Oceans (DFO) at the Freshwater Institute (FWI) located at 501 University Crescent, University of Manitoba.

The intention of this report is to develop a general project description; preliminary architectural, mechanical and electrical technical requirements; and EC & DFO parking requirements for staff and fleet vehicles with a proposed option. In addition, two separate functional programs were developed for EC & DFO with a proposed test plan for each department. In addition, the report includes a preliminary building and site capability section to assess how well the FWI meets the co-location project requirements and recommendations to suit. project. Finally, a Class D cost estimate has been provided.

- .1 In general, the FWI is robust and durable with ample base building areas, components and systems to support the project. As all areas affected by the new design and construction work will need to be compliant with Workplace 2.0 (WP2.0), significant interior fit-ups will be required to complete the project; and, the building is capable of accommodating these fit-ups. Some base building areas and components will require upgrades including:
 - .1 Sprinklers – the entire building will need to be sprinklered
 - .2 Parking – 304 new paved asphalt parking stalls will need to be added as an extension to the south parking lot for staff vehicles; and security fencing upgrades will need to be provided at the north west parking lot to accommodate 45 EC fleet vehicles
 - .3 Roof – the existing roof covering is beyond it's expected lifecycle with reports of leaking occurring – this should be addressed but is not part of the scope of this project
 - .4 Building Code Issues – some more significant building code issues include a 2nd means of egress from Level 2; exit stair guardrails should be upgraded; minimum number of washrooms should be provided; and barrier free deficiencies should be addressed.
 - .5 Hazardous Material Abatement – a detailed hazardous material assessment and abatement should be performed before and during construction. A Report dated October 7, 2016 and prepared by Pinchin Ltd identifies significant asbestos-containing materials (ACM) on mechanical ducts, piping and systems; vinyl sheet flooring; lab countertops; and ceilings. In future design phases and once the scope of construction work is well defined, a set of hazmat drawings and specifications should be developed to ensure all ACMs are appropriately removed and abated.

- .2 In order to accommodate the project, a Class D estimate was prepared in December 2016 (*based upon Option J*) with the following results:
- | | | |
|----|----------------------------------|---------------|
| .1 | Base Building Construction Cost: | \$3.0 million |
| .2 | EC Construction Cost: | \$5.8 million |
| .3 | DFO Construction Cost: | \$6.2 million |
-
- | | | |
|----|-------------------------------|----------------|
| .4 | Total 2018 Construction Cost: | \$15.0 million |
|----|-------------------------------|----------------|
- This Class D construction cost estimate should be updated in future design phases of the project to ensure the required renovation areas are accurately reflected in the estimate.*
- .3 Programmatically, the maximum space allocation for EC as per WP2.0 standards exceeds the total floor area assigned by 223m². Likewise, for DFO, the maximum space allocation as per WP2.0 standards exceeds the total floor area in the test plan by 290m² - the reason for the DFO shortfall is due to the request by DFO to minimize the loss of lab space. These shortfalls can be addressed by:
- .1 Accepting the shortfalls – future design phases will need to incorporate creative and efficient reductions in circulation areas; open space support areas and design contingencies; and sharing of WP2.0 support spaces between EC and DFO.
- .2 Provide an additional 223m² at FWI for EC. Convert an additional 290m² of existing labs to office area for DFO.
- .3 Locate DFO office environment space to the Annex to “free-up” space for EC
- .4 Decrease EC and DFO functional program spatial requirements.
- .4 EC Recommendations – moving forward into the design phases of the project, the following is recommended to accommodate EC’s needs:
- .1 Provide additional 223m² at FWI to be consistent and equitable with WP2.0.
- .2 Review location of Enforcement Branch (EB) security suite – currently this is located on the south west side of Level 2 with no access to natural daylight. It is recommended that this suite be located in the Administration Block on Level 1. This would allow for a secure area and partial natural daylight for FTEs. In addition, the limited number of windows would also provide a higher level of privacy for the confidential operations of the EB.
- .3 Review location of labs – currently many labs are to be located in the Administration Block. It is recommended that EC consider locating labs in the Lab Block backing onto the central service shaft.
- .5 DFO Recommendations – moving forward into the design phases of the project, the following is recommended to accommodate DFO’s needs:
- .1 Provide additional 290m² at FWI to be consistent and equitable with WP2.0.
- .2 Consider re-locating Ecosystems Management (EM) to the Annex. This would “free-up” more office space for collaboration and support areas for DFO and accommodate shortfalls. EM has been identified as the single largest branch with 4 divisions and 65 FTEs. The nature of work for EM has been identified as office-related which would be a suitable function for the Annex.

- .3 Consider demolition of the 2 lab freezer/ refrigerator spaces on Level 5. Additional freezer/ refrigerator spaces, if required, can be located on Levels 1 to 4 where the Science groups are located. A large bank of freezer/ refrigerators currently exist on Level 1 NW quadrant in addition to freezer/ refrigerators on Level 2 and 3.
- .4 DFO should internally and critically assess current and future lab needs to ensure 100% utilization of labs.

1.2 FRESHWATER INSTITUTE (FWI)

- .1 Established in 1972 on leased property at the University of Manitoba in Winnipeg, the FWI is the major regional laboratory for DFO. The FWI complex contains research laboratories, a library, a small craft harbours facility, a solar warehouse, a wastewater treatment plant, an ozone waste treatment facility, and two auditoria. The Institute houses several programs of DFO. It is a national centre of expertise in aquatic biology and freshwater and marine fisheries. In conjunction with the Bayfield Institute in Burlington, Ontario, FWI serves as a focal point of scientific research in the DFO Central and Arctic Region and for fishery, fish habitat and oceans management programs.
- .2 The original FWI facility was designed in 1969 by GBR Architects and Engineers of Winnipeg. The original facility was completed in 1972 and comprised of the following major components:
 - .1 3 storey Administration Block
 - .2 5 storey Lab Block
 - .3 3 storey Service Block

The building is a robust unsprinklered 21,725m² cast-in-place and precast concrete structure. Originally designed to accommodate laboratory needs, a large portion of the labs in the Lab block have slowly been re-purposed to storage areas, office areas and general purpose areas. The need for true labs space has diminished significantly. At the FWI, it is the intention of the co-location project to accommodate the office and special purpose space requirements for approximately 168 EC employees and 286 DFO employees by following WP 2.0 as per the directive of the Privy Council Office of Canada to the greatest extent possible.

- .3 The existing office and lab arrangement at the FWI does not meet current WP2.0 standards. In particular, the majority of staff currently occupy private offices at the perimeter of the building.

1.3 ENVIRONMENT CANADA (EC)

- .1 EC currently has two sites in Winnipeg:
 - .1 123 Main Street housing general administrative offices (located on 3 levels) and special purpose space. Outdoor parking is provided for (oversized) fleet vehicles (approx 45).
 - .2 1821 Wellington Avenue (adjacent to Winnipeg International Airport) comprised of a heated warehouse (storage of equipment and includes workshops for repair and calibration of instruments), an unheated warehouse (storage of large or expensive equipment including ATV's, boats, etc.) and an outdoor storage compound for storage of equipment and vehicles.
- .2 This co-location project was originally intended to relocate EC's operations at 123 Main Street and 1821 Wellington Avenue to the FWI. After review during the pre-design phase, it was determined that the existing Dive Locker, Solar Warehouse and Secure Storage Garage at the FWI complex are at 100% capacity and it is not possible for EC to locate their 1500m² warehouse storage, 300m² cold storage and 1200m² yard storage to FWI without considerable downsizing of DFO and EC. Therefore, only operations at 123 Main Street will be accommodated at the FWI.
- .3 EC requires office space for 168 employees + special purpose space (SPS). SPS requirements have been defined by EC and are provided in further detail in this report.

1.4 DEPARTMENT OF FISHERIES AND OCEANS (DFO)

- .1 DFO currently occupies the entire FWI as the sole tenant.
- .2 DFO requires office space for 286 employees + special purpose space (SPS). SPS requirements for DFO include a Finance Archive area; and Fisheries Management Interview Room and Firearms Storage Area. In addition to these spaces, labs are a significant requirement for DFO. DFO indicated that existing lab usage is not efficient as per a 2009 Lab Utilization report. Labs are currently used as office space and storage space. Program groups are scattered over several levels resulting in:
 - .1 Unnecessarily high operating costs
 - .2 Non-conformance with Federal fit-up standards
 - .3 Minimizing staff interaction; excessive travel distances within program groups
 - .4 Unhealthy work environment (no access to views or daylight)
 - .5 Space shortage (there is a lack of available lab and office space)

DFO confirmed that the following labs could not be relocated:

- 1. Level 1 – 0 labs
- 2. Level 2 – 8 labs
- 3. Level 3 – 6 labs
- 4. Level 4 – 13 labs
- 5. Level 5 – 2 labs

The proposed test plan retains these lab functions in their current location. In addition, with the re-organization of DFO groups, existing labs will be re-purposed as required by DFO to accommodate SPS needs. DFO will internally assess the lab needs of various groups.

2.0 General Narrative Description

2.1 DESIGN INTENT

- .1 In general, the intent of the co-location project is to accommodate the current and long term functional programmatic needs of EC and DFO to co-locate at FWI. This will be accomplished by:
 - .1 Providing a flexible and adaptable office environment based upon WP2.0
 - .2 Providing function-based support space
 - .3 Delivering long-term value and cost effectiveness
 - .4 Allocating space consistently and equitably
 - .5 Promoting the flow of natural light into the space
 - .6 Promoting and supporting user control, productivity and effectiveness
 - .7 Supporting common collaborative tools, technology and spaces
 - .8 Promoting a healthy work environment

2.2 SECURITY

- .1 Security Zones - The facility will require the following security zones:
 - .1 General access area – Public will be restricted to the main entrance lobby area. All occupants will be required to sign in at the security desk or have card access.
 - .2 EC Office area – EC staff only. This zone will require card access into the main EC office area.
 - .3 EC Secure areas – EC cleared staff only. This zone will require card access into the main circulation corridor and into each lab and room. For example:
 - .1 Corporate Services Branch requires a secure mail room for storage of sensitive documents and security access cards; and a secure computer room for storage of small attractive/ desirable items and computers
 - .2 Suite of rooms for Environmental Branch – RCMP Level II standards – firearms storage area, secure interview room. Within secured EB facilities, space shall be accessed by way of secondary and where necessary, tertiary access points, by restricted EB enforcement personnel that have, at a minimum, secret security clearance. All space shall remain secured as much as possible. Doors will not be propped or held open at any time.
 - .4 DFO Office area – DFO staff only. This zone will require card access into the main DFO office area.
 - .5 DFO Secure areas – DFO cleared staff only. This zone will require card access into the main circulation corridor and into each lab and room. For example:

- .1 NAAHP lab has restricted access to ensure ISO certification and protocols around viruses etc. are followed;
 - .2 Fisheries Management requires dedicated storage for enforcement equipment and firearms; and
 - .3 Material & Procurement Services requires chain link fenced areas in warehouse areas
- .2 In keeping with WP 2.0, office support areas like quiet rooms and small meeting rooms, staff can have secure, confidential discussions in closed door situations.
 - .3 Lockable filing cabinets and safes are to be used to secure confidential information in the WP2.0 “open office environment”.
 - .4 Card Access Control system
 - .1 Movement within the building will be controlled with card access
 - .2 Access to various locations of the building will be required

2.3 **SUSTAINABLE DESIGN**

- .1 Although specific sustainable design standards have not been adopted for the proposed co-location project, all design solutions should endeavour to apply contemporary sustainable design principles including, but not limited to, energy efficiency, water conservation, construction waste diversion, high recycled content in materials and durable materials.
- .2 The EC & DFO co-location project could be an opportunity to showcase current sustainable design opportunities. Strategies during design could include:
 - .1 Photovoltaics
 - .2 Displacement ventilation
 - .3 Bicycle Facilities - promote bicycling and transportation efficiency and reduce vehicle distance traveled.
 - .4 Shower Facilities - improve public health by encouraging utilitarian and recreational physical activity.
 - .5 Reduced Parking Footprint - minimize the environmental harms associated with parking facilities, including automobile dependence, land consumption, and rainwater runoff.
 - .6 Green Vehicles - reduce pollution by promoting alternatives to conventionally fueled automobiles.
 - .7 Tenant Design and Construction Guidelines - educate tenants in implementing sustainable design and construction features in their tenant improvement build-outs.
 - .8 Indoor Water Use Reduction - reduce indoor water consumption.
 - .9 Building Level Water Metering - support water management and identify opportunities for additional water savings by tracking water consumption.

- .10 Water Metering - support water management and identify opportunities for additional water savings by tracking water consumption.
- .11 Construction and Demolition Waste Management Planning - reduce construction and demolition waste disposed of in landfills and incineration facilities by recovering, reusing, and recycling materials.
- .12 Minimize Chemical Content in Furniture and Furnishings - enhance the environmental and human health performance attributes associated with freestanding furniture and medical furnishings.
- .13 Enhanced Indoor Air Quality Strategies - promote occupants' comfort, well-being, and productivity by improving indoor air quality.
- .14 Low-Emitting Materials - reduce concentrations of chemical contaminants that can damage air quality, human health, productivity, and the environment.
- .15 Construction Indoor Air Quality Management Plan - promote the well-being of construction workers and building occupants by minimizing indoor air quality problems associated with construction and renovation.
- .16 Indoor Air Quality Assessment - establish better quality indoor air in the building after construction and during occupancy.
- .17 Interior Lighting - promote occupants' productivity, comfort, and well-being by providing high-quality lighting.
- .18 Daylight - connect building occupants with the outdoors, reinforce circadian rhythms, and reduce the use of electrical lighting by introducing daylight into the space.
- .19 Acoustic Performance - provide workspaces that promote occupants' well-being, productivity, and communications through effective acoustic design.
- .20 Heat recovery – ensure HRV are included in the design and construction to minimize any heat loss from mechanical ventilation
- .21 Advanced control and fault detection (typically a software layer that sits above the BAS software).
- .22 Advanced glazing (myriad options of films and controllable glazing e.g. photochromic)

2.4 PRELIMINARY AHJ, CODES, REGULATIONS, STANDARDS

- .1 The NRC National Building Code of Canada, latest edition, (including Manitoba Amendments)
- .2 The NRC National Fire Code of Canada, latest edition.
- .3 The NRC National Plumbing Code of Canada, latest edition.
- .4 The NRC Model National Energy Code for Buildings, latest edition.
- .5 CSA C22.1-09, Canadian Electrical Code Part I Safety Standard for Electrical Installations and CE Code Handbook. Amendments for Provinces
- .6 American Society for Testing and Materials (ASTM)

- .7 The Canada Labour Code
- .8 The Canada Occupational Health and Safety Regulations
- .9 City of Winnipeg Sewer By-Law No. 92/2010
- .10 American National Standards Institute (ANSI) Standard Z358.1-2014 "Emergency Eyewash and Shower Equipment"
- .11 NFPA "Fire Protection Guide to Hazardous Materials"
- .12 G1-031 Physical Protection of Computer Servers
- .13 SECURITY GUIDE SSB/SG-21 CONSTRUCTION OF A SPECIAL DISCUSSION AREA, AUGUST 1988
- .14 G13-01 Secure Storage Rooms (SSR)
- .15 G13-02 Secure Demising Wall (SDW)
- .16 G1-024 Control of Access
- .17 Manitoba Plumbing Code, latest edition.
- .18 ASHRAE Standards
- .19 NFPA Standards
- .20 Natural Gas Code
- .21 Boiler Code
- .22 SMACNA Standards
- .23 City of Winnipeg Drainage Bylaws
- .24 Security Standards
- .25 Manitoba Provincial Building and Fire Codes

2.5 SITE DESIGN

- .1 Vehicular Access
 - .1 Vehicular access to the site is readily available from major roads including the Perimeter highway to the west and University Crescent to the east. Smaller feeder roads provide good access from all directions.
 - .2 Entry to the site will be easy to navigate for visitors, staff and other services by providing designated vehicle access.
- .2 Vehicular Parking
 - .1 Majority of parking space will be assigned to staff with limited visitor parking clearly shown in designated areas.
 - .2 Fleet parking for DFO is already accounted for and will remain as-is.
 - .3 Fleet parking for EC is proposed at the north-west area of the site. This area will require upgrades: security fencing, additional exterior lights, vehicular sliding gate

- .4 Additional parking requirements for the co-location project is provided in further detail later in this report.
- .3 Emergency Access
 - .1 Emergency vehicle access is considered to be good. All new site upgrades including parking areas will need to maintain all emergency access routes.
- .4 Pedestrian Access
 - .1 Pedestrian access to the site is good as it is well connected to walkways at the University of Manitoba.
 - .2 Pedestrian paths will provide employees and visitors with a safe means to travel around the building between exterior amenities without vehicular disruption.
- .5 Public Transportation
 - .1 Public transportation access to the site includes numerous buses which operate frequently during the weekdays. Weekend routes are limited.
- .6 Landscaping
 - .1 Landscaping will accentuate the aesthetics of the building, as well as integrating with travel paths. Existing trees and foliage are to be preserved where possible.
- .7 Fencing
 - .1 1800 high chain Link fence is required around perimeter of site
 - .2 Vehicle gate will be opened during regular building hours
 - .3 Off hour access will be provided through vehicle gate with card access
- .8 Parking lot
 - .1 Parking lot to be hard surfaced with catch basins connected to the City storm water sewage system and designed for storm water retention.
 - .2 Additional site services include:
 - .1 Sewer
 - .2 Storm
 - .3 Signage

3.0 Architectural Technical Requirements

3.1 GENERAL REQUIREMENTS

- .1 01 52 00 - Construction Facilities & 01 56 00 - Temporary Barriers and Enclosures
 - .1 Temporary facilities and controls are required for performance of work of the construction Contract to minimize disruption of existing occupants.
 - .2 Contractor's Office: Contractor should provide and maintain, during the entire progress of the work, a suitable office on the site, for own use, with suitable tables or benches for the examination of drawings, specifications, etc., and where all notices and instructions from PWGSC may be received and acknowledged. Provide meeting space for 20 persons with chairs and table space for site meetings.
 - .3 Hoarding: Locations should be indicated on drawings.
 - .4 Fencing: Fencing should be indicated on drawings.
 - .5 DUST TIGHT SCREENS - Dust tight screens or partitions will be required to localize dust generating activities, and for protection of workers, finished areas of Work, occupants and public.
 - .6 Phasing: Phasing of the construction work will need to be addressed during design. Swing spaces will need to be provided and could include occupation of the Annex.

3.2 EXISTING CONDITIONS

- .1 02 41 16 – Demolition
 - .1 Demolition could include the following:
 - .1 Light fixtures & Electrical equipment
 - .2 Radiant convectors
 - .3 Sheet metal ducting
 - .4 Ceiling and wall registers and diffusers
 - .5 Windows, glass, doors and hardware
 - .6 Cabinet work and fitments
 - .7 Miscellaneous metals
 - .8 Plumbing fixtures
 - .9 Metal toilet partitions
 - .10 Partitions – gypsum board/ steel stud & concrete block
 - .11 Ceilings & Flooring
 - .12 Lab equipment
 - .13 Mirrors & Shelving

- .14 All demolition work will need to be co-ordinated with all HAZMAT abatement work
- .2 02 81 01 - Hazardous Materials
 - .1 Hazardous Material Abatement – a detailed hazardous material assessment and abatement should be performed before and during construction.
 - .2 A Report dated October 7, 2016 and prepared by Pinchin Ltd identifies significant asbestos-containing materials (ACM) on mechanical ducts, piping and systems; vinyl sheet flooring; lab countertops; and ceilings.
 - .3 In future design phases and once the scope of construction work is well defined, a set of hazmat drawings and specifications should be developed to ensure all ACMs are appropriately removed and abated.
 - .4 At this time, locations of materials have not been included in space summaries, room data sheets or test plans due to the fact these components are dynamic and always changing. It is recommended that a separate set of drawings be created to locate and quantify abatement materials in future design phases of the co-location project to ensure they are removed appropriately.

3.3 MASONRY & METALS

- .1 04 22 00 - Concrete Unit Masonry
 - .1 Labs are typically constructed with 200mm concrete block and are in good condition.
 - .2 New labs will require new masonry work
 - .3 Labs that are scheduled to be renovated will require CMUs
- .2 05 50 00 - Metal Fabrications
 - .1 Modify Stair Handrails & Guardrails – all Exit stair handrails
 - .2 Upgrade all guardrails in all exit stairs to meet the current building code.

3.4 WOOD, PLASTICS AND COMPOSITES

- .1 06 40 00 - Architectural Woodwork
 - .1 Custom grade casework, including drawers, shelving, doors and edge banding as described in AWMAC “ARCHITECTURAL WOODWORK STANDARDS” is the recommended quality reference for casework
 - .2 Cabinet Doors: Edge banded hardwood plywood doors are acceptable if they do not exceed 450 mm(w) x 1200 mm(h) in size.
 - .3 Finish: brushed metal preferred
 - .4 Cabinet hinges: concealed hinges preferred
 - .5 Drawer glides: ball bearing type preferred
 - .6 Cabinet door and drawer pulls: simple design preferred
 - .7 Counter Tops: Self-edge type, with back splash and side splash sections site installed and sealed using transparent silicone sealant. Hardwood edge may be

appropriate in some applications. Avoid the use of post-formed laminate counter tops with integral back or side splashes.

- .8 Plastic Laminate: General purpose grade, complete with backing sheets, velour or suede finish. Texture patterns preferred in all high rate of use areas. Solid colours acceptable only in low-use areas. Generally, avoid using wood grain laminate patterns.
- .9 Local wood millwork products include but are not limited to: stain or paint grade solid wood, No Added Urea Formaldehyde Medium Density Fiberboard (MDF), No Added Urea Formaldehyde particleboard, composite wood and wood veneer.
- .10 To ensure environmental sustainability, sourcing wood from sustainably managed forests such as those certified under the Forest Stewardship Council International (FSC International) or the Program for the Endorsement of Forest Certification Schemes (PEFC International) should be considered where available.
- .11 Shelving: The use of premanufactured shelving systems is preferred to custom millwork particularly in Storage rooms. Metal storage shelving should be considered as an alternative to built-in shelving where appearance is not critical. Height limitations should be considered to ensure adequate coverage of sprinkler systems.

3.5 **THERMAL AND MOISTURE PROTECTION**

- .1 07 84 00 – Firestopping
 - .1 Refer to the current edition of the National Building Code when establishing requirements. The local authority having jurisdiction should also be consulted.
 - .2 Firestop systems, tested to ULC S115, are assigned an F, FT, FH or FTH rating as follows:
 - .1 F Rating: The firestop system remained in place and prevented the occurrence of flaming on any element on the unexposed side of the system for duration of test. The F rating forms the basic requirement for all firestop systems.
 - .2 FT Rating: In addition to meeting requirements for the F rating, the firestop system limited temperature rise to a maximum of 181°C above initial temperature on unexposed surfaces for duration of test.
 - .3 FH Rating: In addition to meeting requirements for the F rating, the firestop system successfully resisted the impact, erosion, and cooling effects of a prescribed hose stream test immediately after a fire exposure test.
 - .4 FTH Rating: The firestop system meets the requirements of each of the individual F, FT, and FH Ratings.
 - .3 Refer to ULC S115 for a more complete description of ratings and test method.
 - .4 Conditions may require specifying a higher level of performance, e.g. by specifying a more stringent rating; or by adding prescriptive specifications.

Following are examples of when it may be desirable to exceed Code requirements:

- .1 Piping containing heating or cooling media may require isolation from wall construction to permit movement due to expansion and contraction or for acoustical isolation, making the minimum Code required tight fit undesirable. In such cases, a firestop system with movement capability should be specified.
- .2 Halon fire suppression systems may create high differential pressures across fire separations when activated. Firestopping with an H rating demonstrates a relatively greater ability to remain in place under pressure and may be an appropriate additional requirement in such cases.
- .3 Systems for grouped electrical cable penetrations may have to allow easy removal or addition of cables. An elastomeric coating over mineral fibre, or a foam material, may be preferable.
- .4 Systems generating dust particles or air-borne fibres during application or retrofitting may be unacceptable in certain environments.

3.6 **OPENINGS**

- .1 08 11 00 - Doors and Frames
 - .1 The existing interior doors are a combination of wood and metal.
 - .2 New doors and frames in high traffic areas or labs should be constructed of metal.
 - .3 Solid core wood doors are preferred for all interior office locations to maximize expected life cycle and provide acoustic resistance for sound privacy.
 - .4 Grade of door should be appropriate to proposed finish.
 - .5 Interior door frames requiring a Fire Protection Rating (FPR) should be metal.
 - .6 Interior door frames may be wood or metal.
 - .7 Fully welded metal frames are recommended over knock-down frames.
- .2 08 50 00 – Windows
 - .1 All new openings (Admin Block windows, 2nd floor exit) in the existing envelope will need to be assessed during design. Windows should match existing: dark bronze anodized aluminum frame with fixed double glazed units.
 - .2 The number, size and location of windows should be carefully selected for energy conservation, views and natural light character (glare, sun angles); must be carefully considered when selecting and locating windows.
 - .3 Windows are recommended to have as a minimum double-glazed sealed glazing units with low "E" coating, or triple-glazed sealed units.
- .3 08 71 00 - Door Hardware
 - .1 All Interior Doors will need to be replaced where affected by the Co-Location project. Door knobs will need to be replaced with levers.

- .2 Locksets - Selection should be coordinated with maintenance staff so that operational and maintenance preferences and standard keying systems are accommodated.
- .3 Power Door Operators - Electric power door operators recommended for installation are units which do not prevent a door from being operated manually when the power is periodically interrupted, or when the power unit becomes non-operational.
- .4 Hinges - Interior doors are to be equipped with ball bearing butt hinges

3.7 **FINISHES**

- .1 09 29 00B - Gypsum Board
 - .1 Interior wall surfaces are both very visible and subject to wear and tear damage. Regular maintenance by cleaning, patching and refinishing should be implemented.
 - .2 Interior wall surfaces located where impacts or rough usage are known to exist are recommended to be impact resistant or be suitably reinforced with impact resistant stiff materials. Surfaces should be washable, and easily repairable.
 - .3 Painted gypsum board is the preferred wall finish.
 - .4 Washroom ceilings - Seamless construction such as gypsum board is generally recommended
 - .5 The majority of new partitions will be constructed of steel stud and gypsum board in the office areas.
- .2 09 30 13B - Ceramic Tile
 - .1 Washroom facilities are provided throughout the Lab Block. Upgrading these facilities to include barrier free provisions is recommended as they do not meet current building code requirements. Finishes in the washrooms are durable and robust. However, they are dated and may need to be updated to achieve a uniform aesthetic on all floors to accommodate this project.
 - .2 Ceramic tiles are recommended as the advantages of durability and toughness outweigh the disadvantages of high initial cost. When tile is appropriate, neutral colours should be selected and accent colours avoided.
- .3 09 51 13 - Acoustical Panel Ceilings
 - .1 Suspended Acoustic Panel Ceilings will need to be replaced where affected by the Co-Location Project.
 - .2 A suspended ceiling system is recommended in the office areas where large ceiling areas need to be covered, and where the ceiling material does not provide part of the thermal, moisture or air barrier functions of the building envelope
 - .3 Avoid using suspended ceilings with lay-in acoustic units in public use areas where the ceiling height is lower than 2.5 m above the floor, above stairs, or above areas in dusty locations that require frequent cleaning.

- .4 Use of the plenum space above suspended ceiling systems for unducted ventilation purposes such as relief or return air distribution is not recommended.
- .5 Every effort is to be made to allow the facility to be reconfigured without major impact to the ceiling.
- .6 Ceilings shall allow for work environments such as workspaces, offices and support spaces to be reconfigured and moved without major impact to the ceiling above resulting in minimal to no associated costs.
- .7 Specify ceiling boards that have a minimum CAC rating of 35 for closed office areas or other rooms that require speech privacy. Generally, these boards will be mineral fibre type.
- .8 Provide a sound absorptive ceiling finish in all general office space, corridors and lobby areas. Ceiling boards or other ceiling finishes should have a minimum NRC of 0.60.
- .4 09 54 23 - Linear Metal Ceilings
 - .1 Lab Block Main Corridor - The existing linear metal ceiling system should remain but may require patching and making good.
 - .2 All new material should match existing in terms of colour, profile, gauge and installation.
- .5 09 65 16 - Resilient Sheet Flooring
 - .1 Lab Block Main Corridor - Upgrade the floor finishes in the corridor to provide a uniform appearance and replace original materials that are at the end of their lifecycle.
 - .2 Resilient flooring includes a range of synthetic flexible roll and sheet goods and small format tiles.
 - .3 Installation of resilient flooring onto concrete slabs on grade must be done with added care, and with consideration of the limitations of both the resilient flooring material and adhesives used, as well as the potential for water vapour or moisture to be trapped under the resilient flooring and affect the glue bond.
 - .4 Rubber flooring is generally recommended for superior resiliency, durability and clean ability. Rubber flooring is a better total service life cost choice than linoleum or vinyl.
- .6 09 67 16 Epoxy Flooring
 - .1 A broad range of epoxy flooring materials are available for installation over cured and dry concrete substrates at lower cost and installation complexity than integral coloured concrete hardening compounds.
 - .2 Some epoxy flooring compounds can be specified with high chemical, abrasion resistance and moderate moisture tolerance. Epoxy flooring is recommended for installation in fairly large floor areas where the edge finishing details and joints between dissimilar materials are not critical. Specially designed epoxy flooring with elastomeric membranes is recommended in wet areas.

- .7 09 68 00 – Carpeting
 - .1 Modular carpet flooring, consists of dense vinyl-based composite sheet backing material integrally bonded with a dense low-profile covering of carpet fibre, and is suitable for most moderate or low traffic occupancies
 - .2 Care must be taken to ensure substrates are smooth, contaminant free and not subjective to excessive local heating (maximum 34 Deg. Celsius) for a durable installation.
 - .3 Improved product manufacturing and performance for cleaning ability, bacteriological contamination resistance, wear resistance and installation maintenance have made this material more suitable for office environments.
 - .4 When selecting carpet tile consider the soil and stain hiding capabilities, colour, tone value and pattern.
 - .5 When selecting more than one type of carpet tile, ensure heights are consistent.
 - .6 The use of both carpet tile and conventional roll goods (broadloom) is permitted, however, carpet
 - .7 tile is recommended as it is sustainable, reduces waste and eases maintenance as soiled or worn
 - .8 areas can be changed easily. While the initial cost for carpet tile may be greater, the life-cycle cost
 - .9 is far cheaper than rolled goods. Specifications for carpet selection are available from Architecture
 - .10 and Interior Design, Technical and Professional Services, PWGSC.
- .8 09 69 00 - Access Flooring
 - .1 Access flooring will be required throughout the weather office area and server rooms.
 - .2 Ramps and rails for barrier free access will need to be provided.
 - .3 Verify design requirements to include for:
 - .1 Stairs, ramps and railings.
 - .2 Excessive floor loading.
 - .3 Cable cut-outs.
 - .4 When flooring system must be sealed as a plenum, check for plenum dividers and zoning divisions. Verify and coordinate plenum requirements with mechanical sections.
 - .5 When the underfloor cavity is an air distribution plenum for electronic data processing equipment, ensure that potential sources of dust such as unsealed concrete are eliminated to the extent possible.
- .9 09 91 23 - Interior Painting
 - .1 Lab Block Main Corridor - Upgrade the wall finishes in the corridor to provide a uniform appearance and replace original materials that are at the end of there lifecycle

- .2 All new renovated areas including office and lab areas.
- .3 Water-based acrylic latex paints are recommended. Durable recommended products are listed with the (MPI) Master Painting Institute (APL) Approved Products List, found in the MPI Manual, available from:
<http://www.paintinfo.com>
- .4 Paint shall be low VOC.
- .5 Use corner guards to protect painted corners, and any other applicable areas.

3.8 SPECIALTIES & FURNISHINGS

- .1 10 21 13.13 - Metal Toilet Compartments
 - .1 Reconfigure washrooms to meet barrier free requirements and to provide minimum numbers based upon current building code. Existing finishes in the washrooms are durable and robust, however, they are dated and may need to be updated to achieve a uniform aesthetic on all floors to accommodate this co-location project.
 - .2 Standard baked enamel finish metal partitions for toilet stall compartments are recommended.
 - .3 Floor mounting is recommended.
 - .4 Suspended units should be considered when frequent sanitation cleaning of the floor is required, such as in a washroom used by the general public.
 - .5 Backing: Solid wood blocking or backing must be installed for all fixtures, fittings, furnishings, equipment and hardware to be mounted on wood framed or steel stud framed walls.
- .2 12 21 16 - Vertical Louver Blinds
 - .1 Blinds: Adjustable vertical blinds are recommended where control of incident sunlight and retention of visual access is required at the same time.
 - .2 Blinds shall traverse and rotate smoothly, maintaining uniform louvre spacing and orientation.
 - .3 Closed louvres shall overlap 8 mm minimum, 15 mm maximum.
 - .4 Louvres for vertical louvre blinds shall have flame spread ratings and degree of flame resistance to meet NBC. Metal is recommended.
- .3 12 50 00 – Furniture
 - .1 Shall be a non-progressive, unitized and reconfigurable system of panels, from a single manufacturer.
 - .2 Moveable wall system shall be fabricated off-site in a controlled factory environment and be delivered fully finished to site for installation with no construction or finishing required.
 - .3 Allow each wall section be able to be removed, relocated and re-installed in different locations or disturbing panels (left or right), with all parts reusable.

- .4 Panels shall meet the requirements of CAN/CGSB-44.229 and the Purchase Description for Interconnecting Panels and Supported Components published by the Acquisitions Branch.
- .5 Height: The maximum height for panels is 1.37 m (54"). Lower panels allow for increased light distribution and airflow and provide seated privacy. Panels that exceed 1.37 m (54") are considered noncompliant.
- .6 Panels shall be non-acoustic class. High performance acoustical panels do NOT comply with the Standards.
- .7 Panel finish can be fabric upholstered, perforated metal, veneers (wood and plastic laminate) as long as there is no cost differential. All materials shall be manufactured from recycled or other environmentally appropriate materials that respect the selection criteria identified in WP2.0 A7, unless reusing or matching existing panels. Glass panels with a maximum height of 38 cm (15") are allowed but the overall maximum screen height cannot be exceeded. Fully glazed panels and sliding panels do NOT comply with the standards.
- .8 Clients may also purchase accessory items such as mobile whiteboards or add-on translucent or mesh dividers/toppers to create visual privacy with lower screen heights (the maximum screen height cannot be exceeded).
- .9 Each workstation is provided with three duplex power outlets (6 receptacles) and one voice/data outlet.
- .4 D1013 - Passenger Elevators
 - .1 Upgrade the elevator cab controls to conform with current Barrier Free requirements

4.0 Mechanical Technical Requirements

4.1 SITE SERVICES

- .1 All required site services and utilities with respect to the project shall be determined and included in the Scope of Work.
- .2 The site services work shall include, but not be limited to the following:
 - .1 New water supply for new fire protection systems with metering and backflow prevention;
 - .2 Fire hydrants are existing;
 - .3 Existing sewage disposal (both sanitary and storm) and natural gas should be adequate for any renovations.
- .3 New water lines are to be buried a minimum of 2400mm (8'-0"), or as required to prevent freezing.

4.2 BUILDING SERVICES

- .1 General Building Description
 - .1 The building is an existing five storey structure (4 occupied storeys above grade and a mechanical penthouse). Refer to the Architectural Information provided within this Functional Program.
 - .2 The renovated building is not required to qualify for LEED Certification, however all renovations must be designed using good engineering practice for energy conservation as much as possible.
- .2 General Mechanical
 - .1 The building contains existing, main central systems that are very robust and that were originally designed and built for a large laboratory. The Mechanical requirements of a laboratory are much more demanding than the proposed renovations which consist primarily of office space. However, the ultimate replacement of these main systems is beyond the scope of this report. The September 2013 Building Condition Report (BCR) is to be consulted for the condition and life expectancy of the central systems.
 - .2 The down side to the previous point is that the present systems are much less efficient than typical current office systems due to the more demanding and exacting requirements that they were originally designed to fulfill. The demands and requirements of a laboratory result in a causal sequence where ventilation rates are higher, heating and cooling loads are greater, pressures are greater, the equipment is larger and the operating costs are higher. Fine tuning the operation of the existing equipment will reduce the operating costs of the building somewhat but the operating efficiency of this building should not be expected to be that of a new office building. A discussion and a plan from a

broader perspective must be applied which is beyond the scope of this renovation.

- .3 All systems rendered redundant due to the repurposing of spaces are to be removed, eg. laboratory exhaust fans, ductwork, piping, controls, etc. Subsequently, all openings (roof, wall) left redundant are to be patched, insulated, sealed and finishes.
- .4 Insulation on heating and cooling piping fittings was observed that could possibly contain asbestos. This should be thoroughly assessed prior to any renovations.
- .5 This document will focus on the equipment in the proposed renovation areas.
- .6 Room Data sheets have been prepared as comprehensive data and included in an elsewhere in this Functional Program.
 - .1 The Room Data Sheets are to be read in conjunction with the information within this Mechanical Section. Requirements of both the Room Data Sheets and this Mechanical Section shall be met.
- .7 Equipment and System Locations
 - .1 Refer to the Information regarding Mechanical Space Requirements, as presented in a different section of this Functional Program.
- .8 Equipment and Materials
 - .1 Equipment shall have the following general characteristics:
 - .1 Heating and Cooling generation equipment is existing.
 - .2 New Hydronic Heating and Cooling Systems shall have Circuit Setters for balancing.
 - .3 Dual duct Air Terminal boxes: Pressure independent; multi-point sensors for accuracy.
 - .4 Exhaust Fans: In-line; centrifugal; to meet user requirements.
 - .5 Building Control System: Existing.
 - .6 Air Filters, new:
 - .1 All filter media shall be constructed of unbreakable synthetic micro-fibres in 3 stage variable density media.
 - .2 Filters shall be listed at least Class II UL flammability.
 - .3 No filter shall contain asbestos, micro-glass or Urea-formaldehyde.
 - .7 Piping: Use all metallic piping for HVAC and Service Distribution, except where explicitly required for a specific fluid. Plumbing DWV piping may be plastic where permitted by code.
 - .8 Grilles, Registers, Diffusers (GRDs): Equal to Price Manufacturing. Ceiling/sidewall/floor supply/return model to suit application. Final finish selection by the architect.
- .9 All new piping, ductwork and equipment shall be identified and labelled in accordance with existing building practice.

- .3 Insulation
 - .1 General:
 - .1 The following applies to all new piping and ductwork installed in the Co-location project.
 - .2 It is recommended that the services of Hazardous Materials Consultant be retained to review the extent of asbestos and assess the removal in areas of general demolition and where new connections to new piping are to be made.
 - .2 Insulate the following piping:
 - .1 Domestic hot, cold and recirculation piping
 - .3 Insulate the following ductwork:
 - .1 Outside air, and mixed air ductwork and plenums.
 - .2 Exhaust ductwork back 10' (3M) from roof or wall.
 - .3 Acoustic insulation on supply & return duct plenums connected to central Rooftop/Air Handling units where required for sound considerations.
 - .4 Pre-Formed Pipe Insulation for Cold Piping:
 - .1 Provide sectional fibreglass pipe insulation in pre-molded sections 900 mm (36") long; split and ready for application; with a maximum "K" factor of 0.035 at 24°C (75°F) mean temperature; and be capable of use on service from -40°C to 260°C (-40°F to 500°F); and with factory applied vapour seal jacket of foil craft laminate with reinforcing of open mesh glass fibre.
 - .5 Pre-Formed Pipe Insulation for Hot Piping:
 - .1 Provide sectional fibreglass pipe insulation in pre-molded sections 900 mm (36") long; split and ready for application; with a maximum "K" factor of 0.035 at 24°C (75°F) mean temperature; and be capable of use on service from -40°C to 260°C (-40°F to 500°F); and with factory applied vapour all service jacket of paper with reinforcing of open mesh glass fibre.
 - .6 Insulation for Ductwork:
 - .1 Exposed rectangular (mechanical rooms):
 - .1 25 mm (1") thick, 48 kg/m³ (3.0 lbs/ft³) density, foil faced fibreglass board.
 - .2 Concealed rectangular:
 - .1 25 mm (1") thick, 48 kg/m³ (3.0 lbs/ft³) density, foil faced fibreglass board, or
 - .2 25 mm (1") thick, 12 kg/m³ (0.75 lbs/ft³) density, flexible fibreglass blanket with open mesh, glass fibre reinforced, foil facing.
 - .7 Round ductwork (not including run-outs to diffusers):

- .1 25 mm (1") thick, 48 kg/m³ (3.0 lbs/ft³) density, foil faced fibreglass board, or
- .2 25 mm (1") thick, 12 kg/m³ (0.75 lbs/ft³) density, flexible fibreglass blanket with open mesh, glass fibre reinforced, foil facing.
- .8 Ductwork exposed to outdoors or handling outdoor air:
 - .1 2 layers of 25 mm (1") thick, 48 kg/m³ (3.0 lbs/ft³) density, foil faced fibreglass board. [Note: Duct sections lined with 25 mm (1") thick duct liner need only have 25 mm (1") exterior insulation applied].
- .9 Insulation for Equipment:
 - .1 2 layers of 25 mm (1") thick, 48 kg/m³ (3.0 lbs/ft³) density, foil faced fibreglass board. [Note: Duct sections lined with 25 mm (1") thick duct liner need only have 25 mm (1") exterior insulation applied.
 - .2 25 mm (1") thick, 12 kg/m³ (0.75 lbs/ft³) density, flexible fibreglass blanket with open mesh, glass fibre reinforced, foil facing.
- .10 Miscellaneous Applications:
 - .1 Refrigerant Systems:
 - .1 Pre-formed, 25 mm (1") thick, closed cell rubber, Imcolock or Armaflex, pipe insulation.
- .11 Finishes:
 - .1 Piping (concealed): factory applied jacket.
 - .2 Piping (exposed): 170 g/m² (6 oz/yd²) U.L. labeled canvas with PVC fitting covers.
 - .3 Ductwork (concealed): factory applied jacket.
 - .4 Ductwork (exposed): 170 g/m² (6 oz/yd²) U.L. labeled canvas.
 - .5 Ductwork (exposed outdoors):
 - .1 Two layers of felt paper, tarred and sealed to make weatherproof, or
 - .2 Blueskin poly-type bitumen membrane.
 - .3 Dimple finish 016 aluminum jacket.
 - .6 Refrigerant Piping:
 - .1 Exposed outdoors: Two coats of compatible paint.
 - .2 Indoors: None.
- .12 Insulation Thickness Schedule:
 - .1 Piping:
 - .1 Domestic Cold Water piping: Runouts-12mm (1/2"); piping over 38mm (1 1/2") in size-25 mm (1").
 - .2 Domestic Hot Water Supply and Recirc piping: Runouts-12mm (1/2"); piping over 38mm (1 1/2") in size-25 mm (1").
 - .3 Refrigerant lines: 25 mm (1")
 - .2 Ductwork:

- .1 Supply Ductwork: 25 mm (1")
 - .2 Fresh Air Intake Ducts to air units: 50 mm (2")
 - .3 Mixed Air ducts from Fresh Air duct to Heating Coil: 50 mm (2")
 - .4 Ducts penetrating an exterior building surface [for the last 3000 mm (10'-0")]: 50 mm (2")
 - .5 Ducts outdoors: 50 mm (2")
 - .6 Relief Air ducts: 50 mm (2")
 - .7 Drip pans: 25 mm (1")
- .4 Plumbing
- .1 Refer to the Acceptable Manufacturer's list for the minimum acceptable equipment and styles of equipment. Additional equipment and styles may be provided, depending on alternative systems provided.
 - .2 The existing building includes Domestic Water, DWV, Natural Gas.
 - .3 Domestic Water
 - .1 Provide Backflow Prevention as required to accommodate the new fire protection service.
 - .2 Domestic water system is existing. Connections to be made to nearest available lines to serve new fixtures.
 - .3 All new piping shall be hard copper.
 - .4 Domestic Hot Water System with recirculation;
 - .1 System is existing. Connections to be made to nearest available lines to serve new fixtures.
 - .2 All new piping shall be hard copper.
 - .5 Plumbing Fixtures shall be Water Saving Type, including:
 - .1 Low Water Usage.
 - .2 Lavs with Push-button Metering Controls with Tempered Water Mixing Valves.
 - .3 Toilet to be Wall Hung, Flush valve, Low flush.
 - .4 Automatic Electronic Flush with override button for urinals and public water closets.
 - .5 Waterless Urinals are not acceptable.
 - .6 In addition to Plumbing Fixtures and trim for Standard Washrooms and Change rooms, allow for:
 - .1 Commercial grade fixtures
 - .2 Vandal Proof Fixtures
 - .3 All plumbing fixtures shall have service valves for maintenance purposes.
 - .4 Floor Drains to be installed in all new washrooms and existing washroom where not present.

- .5 Trap Primers for all Floor Drains.
- .6 Kitchenette and Bar Sinks for Lunchrooms, Meeting Rooms, First Aid, and other miscellaneous areas.
- .7 Floor-mounted Mop Sinks with hose end spouts and vacuum breakers.
- .8 Concealed arm carriers with foot support for all wall mounted lavs.
- .9 Showers (new):
 - .1 One-piece acrylic or fibreglass shower surrounds c/w dome and light.
 - .2 Institutional Style Shower Heads, or Handicap Style Shower Wands where required.
 - .3 Pressure balance, scald guard devices for all showers.
 - .4 Vandal proof shower heads
- .10 Drinking Fountains shall be ADA compliant, refrigerated, with S.S. shrouds and bottle filler.
- .7 Natural Gas:
 - .1 Natural gas piping shall be schedule 40 steel, with screwed or welded joints and fittings as per code.
 - .2 Provide natural gas piping to all gas-fired Equipment.
- .8 Roof Drainage: Existing.
- .9 Sanitary Drainage;
 - .1 Sanitary system is existing. Connections to be made to nearest available lines to serve new fixtures.
- .5 Fire Protection
 - .1 The Entire Building shall be fully sprinklered.
 - .2 Because the Building is over 52,000 sq. ft., provide a minimum of 2 Sprinkler Riser Systems.
 - .1 Allow for a minimum of a total of 12 zone alarm valves in order to sub-divide the areas for easy Fire Department recognition of hazard location.
 - .3 A full wet system is expected, with local dry-pipe heads or glycol anti-freeze loops as required to prevent freezing at small individual locations.
 - .4 The Sprinkler System shall be Hydraulically Designed, and Sealed and Signed by a Professional Engineer.
 - .5 Fire Protection piping shall be metallic, as allowed by code, including copper and steel.
 - .6 Sprinkler heads shall be recessed type where exposed to the public in finished areas, and upright type where there are no finished ceilings.
 - .7 Sprinkler heads shall be chrome plated where exposed to the public in finished areas, and brass in unfinished areas.

- .8 Sprinkler heads shall be installed in even rows and columns. They shall be centered both ways in T-bar ceilings.
- .9 Hand held fire extinguishers shall be provided as required by NFPA 10, and shall be ABC, CO2 or type K as appropriate for individual spaces.
 - .1 Wall hung extinguishers may be provided in Utility Spaces.
 - .2 In occupied areas, extinguishers shall be located in recessed cabinets, or wall mounted cabinets where recessed cabinets are not suitable.
 - .3 Provide extinguishers over and above the minimum code requirements to serve higher hazard areas such as Electrical Rooms, Mechanical Rooms, Electrical Shops, Machine Shops, etc.
- .6 HVAC System – General
 - .1 The building's HVAC system is existing and consists of large, central, dual duct air handling units located in the Mechanical Penthouse. These large units simultaneously supply heating and cooling air streams to the spaces within their respective areas through cold and hot air ducts that usually run parallel to each other. The air from these ducts is fed into blending/mixing boxes. There is one blending box per thermal zone though thermal zones may contain more than one room. Depending on the requirement of the thermostat in the zone, the damper inside the blending box will modulate allowing either more hot air or more cold air into the space. Each air stream is maintained at a constant temperature by having heat or cooling added at the air handler. Room around the perimeter of the building also have hydronic (hot water) heaters.
 - .2 Refer to the Acceptable Manufacturer's list for the minimum acceptable equipment and styles of equipment. Additional equipment and styles may be provided, depending on alternative systems provided.
 - .3 The Humidification system is existing and shall remain operational. Components found to be defective shall be replaced or repaired.
 - .4 Laboratory Area HVAC Systems:
 - .1 Existing lab ventilation components (exhaust fans, ductwork, dampers, transfer air, controls) in renovated areas made redundant shall be removed.
 - .2 Existing systems in areas not within the scope of work shall remain.
 - .3 New, relocated Laboratories shall reuse existing laboratory exhaust fans where appropriate with new laboratory exhaust ductwork and supply air. Air to be supplied by two new variable volume systems located in the mechanical penthouse.
 - .4 Refer to the Ventilation Section for additional requirements.
 - .5 Office Area HVAC:
 - .1 Central system is existing and is to remain. Components found to be defective shall be replaced or repaired.
 - .2 Terminal units in renovated areas are to be replaced.
 - .3 Must include Space Heating and Cooling.

- .4 Refer to the Ventilation Section for additional requirements.
- .6 Air Valves for Zone Control:
 - .1 Terminal units are to be equal to Price model DDS dual duct air valves. Controller to match existing. Allow for one unit per renovated room/office/space.
 - .2 All rooms shall have dedicated thermostatic controls connected to the central building system.
 - .3 Units shall include acoustic lined inlet and outlet mains, and distribution ductwork
 - .4 Units shall be located in the overhead interstitial space, or in the ceiling space of individual rooms.
- .7 Heating System
 - .1 The Central Heating system is existing and is to remain. The long-term strategy of the central system is outside the scope of this project. Components known or found to be defective shall be replaced or repaired.
 - .2 Terminal heat transfer units, such as baseboard radiation, in renovated areas are to be re-used as much as possible. Where new walls or partitions conflict with the existing heating unit, the heating unit shall be removed and replaced with new to suit.
 - .3 Piping shall be schedule 40 steel with screwed fittings.
 - .4 Provide circuit setters for each new terminal heat transfer unit.
 - .5 Provide terminal heat transfer units such as Baseboard Radiation, Force Flow Entrance Heaters and Unit Heaters as required at exterior walls, windows and doors.
 - .1 In office areas, flat topped enclosure with bar grille. Single or double tube to match existing piping.
 - .2 In amenity areas, flat topped enclosure with stamped grille. Single or double tube to match existing piping.
 - .3 Fin-tube to be 4" x 4" (102mm x 102mm) aluminum fin over 1 ¼" (32mm) seamless copper tubing.
- .8 Cooling
 - .1 The Central Cooling system is existing and is to remain. The long-term strategy of the central system is outside the scope of this project. Components known or found to be defective shall be replaced or repaired.
 - .2 Cooling (air conditioning) as it affects the renovated spaces is addressed in sections 2.6 and 2.9.
- .9 Ventilation
 - .1 The Central Ventilation system is existing and is to remain. Components known or found to be defective shall be replaced or repaired.
 - .2 Ventilation is supplied by the terminal units described in 2.6.

- .3 Renovated areas to be designed to ASHRAE 62 Ventilation Requirements.
- .4 Provide residential range hoods as required for new kitchenettes.
- .5 Provide ceiling mounted exhaust fans as required for new conference rooms. Fans to be complete with speed control.
- .6 New washrooms to be connected to existing washroom exhaust systems. Provide an HRV where suitable.
- .7 Existing ventilation systems modified for purposes of the project, including specialized systems, shall be returned to as new condition.
- .8 Ductwork and Accessories
 - .1 All ductwork and related accessories shall be installed as per the latest SMACNA standards.
 - .2 Ductwork shall be galvanized sheet metal unless noted otherwise.
 - .3 Use Aluminum or Stainless Steel for high humidity areas or fume hood applications.
 - .4 Balancing dampers shall be provided for each supply air outlet and return/exhaust air inlet.
 - .5 All ductwork shall be sealed with non-toxic duct sealant.
 - .6 Provide internal acoustic insulation at the Inlets and outlets of fans.
 - .7 Fire dampers shall be installed at all locations where ductwork passes through rated separations.
 - .8 Provide duct access doors at all locations required for installation, maintenance or adjustment of equipment or controls.
- .9 In all new or renovated room/office/spaces in the Co-location scope, replace each terminal air unit including, actuating devices and GRDs.
- .10 Replacement air Terminal Units to be equal to Price model DDS dual duct air valves. Controller to match existing.
- .11 Replacement GRDs to be equal to Price. Ceiling/sidewall/floor supply/return model to suit application. Final finish selection by the architect.
- .10 Testing and Balancing of Systems (TAB)
 - .1 The testing and balancing of the systems and fire damper certification shall be by an independent TAB contractor. The systems' capacities shall be balanced to within 10% of design complete with a report for review prior to acceptance of systems.
 - .2 The TAB contractor shall be responsible directly to the General contractor and shall provide all Equipment, Personnel and Material necessary to assist with Air Balancing.
 - .3 The TAB contractor shall be a member in good standing with A.A.B.C., or shall prove their equivalency to the engineer prior to tender close.
 - .4 The TAB contractor shall conduct preliminary and final tests and provide all written reports as specified.

- .5 All new and modified duct systems shall be tested and balanced to the design parameters.
- .6 The TAB contractor shall adjust the outside air at the central air handlers to provide the ventilation rates in accordance with the design.
- .7 New and modified fume hood systems shall be tested and adjusted to the proper operating condition.
- .11 Controls
 - .1 General
 - .1 The Central Controls system is existing and is to remain. The 2013 Building Condition Report mentions that control is provided by a Honeywell XL5000 Control System which controls the building cooling and heating equipment, VAV boxes, and hot water valves. This includes all of the DDC panels in the Annex. The Head end resides in the main building. The long-term strategy of the central system is outside the scope of this project.
 - .2 The existing system is a combination of pneumatic, electric, and digital (DDC). The components include items such as AHU damper actuators, and HVAC space heating and cooling control valves and thermostats.
 - .3 Components known or found to be defective shall be replaced or repaired.
 - .4 The current Building Controls systems can support the Co-location project. New devices would be installed in all renovated areas and connected to the existing main systems. The scope of work for the Co-location project is to include for new temperature control devices in all renovated spaces.
 - .2 Vandal Proof Covers
 - .1 Provide vandal proof covers (guards) on all wall mounted controllers in public areas.
 - .3 Power and Control Wiring, Control Tubing and Accessories
 - .1 Control wiring and conduit shall meet or exceed the requirements of C.S.A., U.L.C., the current edition of the Canadian Electrical Code, and all local Code requirements as well as the requirements as specified in Electrical.
 - .2 All control wiring, regardless of voltage, shall be installed in a continuous, dedicated system of rigid metal tubing (EMT). Maximum lengths of 7 feet of flexible metal conduit will be accepted for final connections to devices and equipment.
 - .3 Compressed air tubing shall be hard drawn copper.

5.0 Electrical Technical Requirements

5.1 GENERAL

- .1 The existing facility is a five story Lab/Office building connected to a 2-story administration building. Refer to Architectural Information provided within this report.
- .2 This report should be read in conjunction with the Room Data Sheets and the September 2013 Building Condition Report.
- .3 This project consists of renovating and re-purposing existing lab space into office and required ancillary spaces.
- .4 In general, the building's electrical systems are of sufficiently capacity to support the repurposing of space.
- .5 Include in the mechanical section, provision of all labour, materials, fees, services and facilities for a complete electrical installation as it relates to mechanical equipment connections.
- .6 Comply with the most current Building Codes, By-laws, and all authorities having jurisdiction.
- .7 This document represents a general project electrical outline. This document is not to be used for construction.
- .8 The project has not been registered with the Canadian Green Building Council but will shadow the objective of achieving energy efficiency.

.9 CODES AND STANDARDS

- .1 Include in the electrical section, provision of all labour, materials, fees, services and facilities for a complete electrical installation. Comply with the most current Building Codes, By-laws, NFPA and all Authorities having Jurisdiction.
- .2 Installation shall comply with the requirements of the applicable Building Codes, latest revisions, all local Municipal Building Codes and Bylaws in effect at the date of execution of the contract, ASHRAE standards and Authorities having Jurisdiction

.10 UTILITIES

- .1 The existing electrical utility adequately serviced the building. No coordination with the utility is expected.
- .2 The existing telephone service located in the basement is expected to be adequate to service to the building.

.11 MAIN DISTRIBUTION

- .1 The existing main-distribution is a 4000amp, 600volt, 3phase, 4wire. No modifications to the main distribution is expected to accomplish the renovation.

.12 SUB-DISTRIBUTION

- .1 There are existing sub-distribution panels (CDP) located through the building. Generally, as it pertains to our, the sub –distribution CDPs are located within the service shaft. As referenced in the September 2013 Building Condition Report (BCR), the large majority of the sub-distribution CDPs are original the building and are past their life-cycle and will not maintenance free. Although all CDPs that are original to the building should be replaced, as it pertains to this project, replace all CDPs with the service shaft. These CDP feed the branch circuit panels that would the renovated spaces.
- .2 There are several existing branch circuit panels on each floor, generally located within the service shaft, which would be used to power the renovation areas under this project. Replace the branch circuit panels with one manufacture.

5.2 BUILDING SERVICES

.1 MECHANICAL EQUIPMENT CONNECTIONS

- .1 Wire and connect all mechanical equipment including, but not limited to: roof top condensing units for lab or special purpose areas. See mechanical specification for further details.
- .2 Wire and connect all line voltage thermostats for heating and cooling.

.2 POWER – MISCELLANEOUS

- .1 Panelboards (and CDP's) must be the product of one manufacturer. Acceptable manufacturers are Cutler Hammer, Group Schneider and Siemens.
- .2 Wire all alarmed fridges and freezers back to Building Management System (BMS).
- .3 Make provisions to wire and connect all pop machines, fridges, microwaves, dishwashers, automatic door opener, etc.
- .4 Conductors in conduits must be solid copper #10 AWG and smaller and stranded #8 AWG and larger. Insulation cross link polyethylene RW-90 or RWU-90 90°C, 600 V must be provided as required. The minimum conductor size must be #12 AWG.
- .5 Armored cables (AC-90) must be solid copper #10 AWG and smaller and stranded #8 AWG and larger. Insulation cross link polyethylene (XLPE) AC-90 may be used for luminaires drop connections in drop ceilings and receptacles in metal stud walls ONLY.
- .6 Armored cables (Teck) must be solid copper #10 AWG and smaller and stranded #8 AWG and larger. Insulation cross link polyethylene (RW-90) 90°C, 600 V FT4 flame rating must be provided as required. Cable must be utilized for mechanical equipment connection for vibration isolation and weatherproofing as required. (Watertight flex conduits can also be utilized).
- .7 Standard electrical duplex receptacles to be specification grade
- .8 Low voltage cables for systems must be multi-conductor type, and minimum 24 gauge complete with FT6 sheathing. All conductors must be in conduit.

.3 SPACE REQUIREMENTS

- .1 As required in Workplace 2.0 and Room Data Sheets. The list below should be reviewed with the Workplace 2.0 and Room Data Sheets requirements.
- .2 Open Work Stations 1.5m² (16ft²)
 - .1 3 standard electrical duplex outlets (1 circuit per 2 workstations)
 - .2 1 Image/voice/data outlet
 - .3 Base building lighting
- .3 Collaborative Spaces
 - .1 3 standard electrical duplex outlets (floor or wall mounted on 2 circuits) per 15m²
 - .2 2 image/voice/data outlet per 15m²
 - .3 Base building lighting
- .4 Enclosed Office Spaces
 - .1 3 standard electrical duplex outlets (2 circuits)
 - .2 2 image/voice/data outlets
 - .3 Base building lighting with 1 separate switch/light control
- .5 Small Meeting Room 14m² (150ft²) (6 people)
 - .1 3 standard electrical duplex outs (2 circuits)
 - .2 2 image/voice/data outlets
 - .3 Base building lighting with separate switch/light control and motion sensor
 - .4 Direct/indirect suspended luminaire(s) to suit meeting (table) function on a separate switch/ light control and motion sensor
 - .5 Dimmable perimeter/accent lighting to support presentation function on a separate switch/ light control and motion sensor
- .6 Medium Meeting Room 30m² (325ft²) (12 people)
 - .1 4 standard electrical duplex outs (2 circuits); 1 only floor mounted
 - .2 3 image/voice/data outlets; 1 only floor mounted
 - .3 Base building lighting with motion sensor
 - .4 Direct/indirect suspended luminaire(s) to suit meeting (table) function on a separate switch/ light control and motion sensor
 - .5 Dimmable perimeter/accent lighting to support presentation function on a separate switch/ light control and motion sensor
- .7 Large Meeting Room (Dividable) 60m² (645ft²) (20 people)
 - .1 4 standard electrical duplex outs (2 circuits); 2 only floor mounted
 - .2 4 image/voice/data outlets; 2 only floor mounted
 - .3 Base building lighting with motion sensor

- .4 Direct/indirect suspended luminaire(s) to suit meeting (table) function on a separate switch/ light control and motion sensor
- .5 Dimmable perimeter/accent lighting to support presentation function on a separate switch/ light control and motion sensor
- .8 Quite Room 5m² (54ft²)
 - .1 2 standard electrical duplex receptacles (1 circuit)
 - .2 1 image/voice/data outlet
 - .3 Base building lighting with 1 separate switch/light control and motion control
- .9 Kitchenette
 - .1 2 standard dedicated electrical duplex outlet receptacles (microwave and fridge)
 - .2 2 standard split circuit duplex receptacles for other countertop appliances (additional receptacles may be added if required)
 - .3 Base building lighting with motion sensors
 - .4 1 separate switch/light control for under cabinet lighting
 - .5 Kitchen exhaust fan
- .10 Shared Equipment Area
 - .1 3 electrical duplex receptacles to equipment needs
 - .2 3 image/voice/data outlets
- .4 EMERGENCY POWER GENERATOR SET
 - .1 The building is equipped with an emergency generator and all associated distribution. There are emergency CDPs and branch circuit panels located throughout the building to serve the emergency lighting as well as other emergency circuits.
 - .2 As referred to in the September 2013 Building Condition Report (BCR) the emergency system is indicated as fair but identified to be replaced by 2018. The system is original to the building. Replace 2 generator, synchronizing, transfer switches and associated equipment.
 - .3 A reliable emergency power systems is critical to the building as the building life-safety relies on the emergency generator this includes emergency lighting, exits as well as for building back-up systems such as heat, lab equipment, etc. The generator is used for life-safety equipment as well as building systems equipment back-up.
 - .4 The emergency power systems do not meet present day code requirements. Most notable is the requirements to separate life-safety and non-life-safety equipment and have them on separate transfer switches. Although the system is grand-fathered as is, provide a new system to include separate transfer switches for life-safety and non-life safety systems.

- .5 As it relates to our proposed renovated spaces the majority of the emergency CDPs and branch circuit panels are located in the service shaft. Replace branch circuit panels on all floors to serve the proposed renovated spaces.
- .6 Refer to Room Data Sheet for equipment requiring back-up generator power. Item requirement back-up power to include sample fridge and freezer, equipment in evidence room, Labs, emergency operations centre, etc.
- .5 VOICE/DATA SYSTEM
 - .1 Collaboration with Shared Services Canada and user representatives will be required to support the new infrastructure required co-locate EC and DFO requirements.
 - .2 Workplace 2.0 identifies the requirements for server rooms and Telecommunication room locates. Under this project, it appears two telecommunication rooms will be required per floor in the Lab building and 1 telecommunication room per floor in the administration building.
 - .3 Provide three (3) CAT6 cables, for image/phone/data, for each outlet to meet workplace 2.0 requirements.
 - .4 Provide data cable for WIFI. Provide one (1) CAT6 cable for each 12 m. sq.
 - .5 Provide labour, materials, and equipment required for a Category 6 Data/Voice wiring system Installation.
 - .6 The contractor is responsible for all facets of the project, including but not limited to, backboards in the LAN room, BIX blocks, patch panels, all terminations.
 - .7 All specifications are to meet the COSAC guideline and applicable IEEE standards for building cabling distribution systems and wiring standards (802.5 inclusive).
- .6 SOUND MASKING
 - .1 Provide sound masking for approximately for open office area, refer to Workplace 2.0 requirements.
 - .1 Provide generator or multiple generators capable of controlling multiple zones.
 - .2 Provide speakers throughout open area spaces. Ceiling height is about 12' AFF to underside of ATC and there is approximately 4' between ATC and underside of deck.
- .7 FIRE ALARM SYSTEM
 - .1 There is an existing 2 stage fire alarm system and the building is currently not sprinklered however a sprinkler system is being considered under this project.
 - .2 The fire alarm system was last replaced in 1998 and considered in fair condition. The Fire Alarm system is scheduled to be replace in 2018 according to the September 2013 Building Condition Report (BCR).
 - .3 The building fire alarm compenence to not all meet present day code. The manual pull station should be lowered and visual strobe should be added to meet local accessibility standards.

- .4 Provide new 2 stage Fire Alarm system, including remote annunciator panels, and initiating devices to comply with the BCR.
- .5 Reconnect Fire Alarm system to Emergency power as require for a full functional system during a loss of utility power.
- .6 Provide new smoke detectors in storage rooms.
- .7 Include all necessary testing and VI reports.
- .8 EMERGENCY & EXIT LIGHTING
 - .1 Replace existing central emergency battery packs. Replace existing remote emergency lighting heads with new LED lighting heads, also provide 120V LED emergency lighting to connect to building UPS inverter power system.
 - .2 Replace all Existing sign within the renovation area and the remainder to the existing building and also the administration building with new Pictogram.
 - .3 Exit lighting must be provided as required by the National Building Code. Exit lights must be LED type maximum 2 watts per exit with 25-year life expectancy. Illuminate all exit paths and exits. Provide LED type AC exit lights at each exit and along all means of egress or access to egress. Must meet CSA-860.
 - .4 Provide battery-bank with two remote heads in new Emergency power electrical room in basements area beside existing electrical room and at Emergency generator location ensure minimum 50 lux to meet Code requirements.
- .9 LIGHTING
 - .1 The existing lighting throughout the building is date and not energy efficient.
 - .2 Provide new LED light fixture within the renovation area.
 - .3 Provide new LED fixture within general public area to meet generally acceptable energy efficiency.
 - .4 Provide minimum light/illumination levels to achieve average maintained lighting as per IESNA office requirements.
 - .5 All branch circuits will be in EMT with AC-90 drops for luminaires or outlets in drywall.
- .10 SECURITY/INTRUSION SYSTEM
 - .1 Modify existing security system to suit new requirements.
 - .2 Add door contacts to doors to doors requiring card access.
 - .3 Coordinate all work to make provisions for miscellaneous conduit and power requirements.
 - .4 Provide alarm signal for existing and new specimen fridge and freezers. Provide alarm module for fridge and freezer alarm to connect to intrusion or building management system. Alarm to notify designated staff member in the event of loss of power or fridge is below designated set point.
 - .5 Provide intrusion sensor in area such as Evidence Storage, Case Preparation, etc. refer to room data sheets and RCMP standards.
- .11 CARD ACCESS SYSTEM

- .1 There is an existing card access system in the building. Add and modify existing system to suit new door requiring card access.
- .2 Provide new card access to room as indicated in the Room Data Sheets and consult owner.
- .12 SITE SERVICES
 - .1 Parking lot to be provided, see architectural section.
 - .1 Provide new parking lot electrical panel.
 - .2 Provide new IPLC receptacles
 - .3 Provide new LED parking lot lighting.

6.0 6.0 Parking Requirements

6.1 GENERAL

.1 In order to accommodate the staff and fleet vehicle parking requirements for the Co-Location project, the following requirements were provided by EC and DFO.

.2 Required Staff parking stalls

.1	EC required Staff parking:	166
.2	DFO required Staff parking:	286
.3	Total required Staff parking:	452

.3 Existing Staff parking stalls:

.1	North west lot	54
.2	North lot	33
.3	South lot	106
.4	Annex	3
.5	Total	196

.4 Proposed New Staff parking stalls:

.1	North west lot	8
.2	North lot	33
.3	South lot	106
.4	Annex	3
.5	New south lot	304
.6	Total	454 (2 extra for growth)

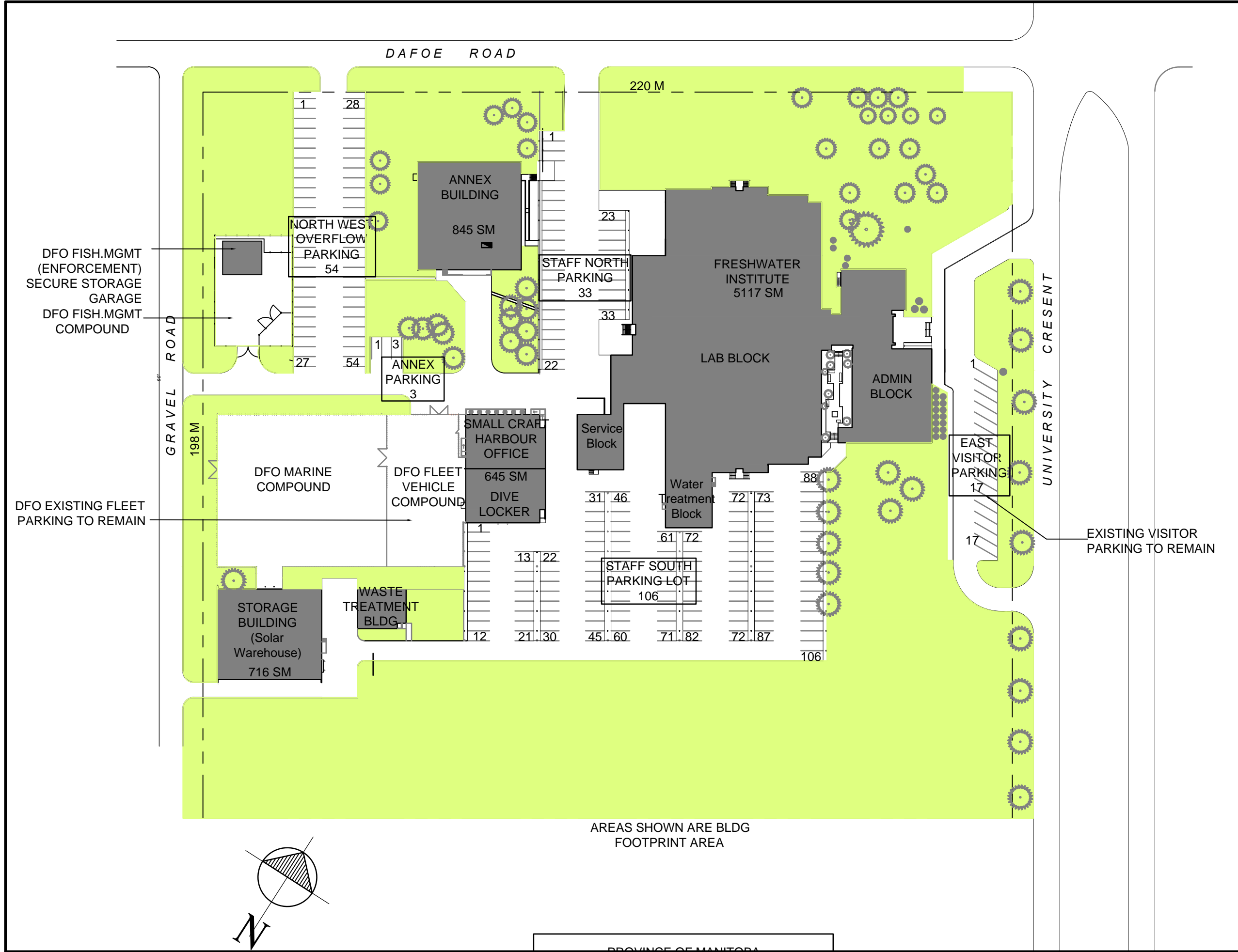
.5 Required Fleet parking stalls


.1	EC required Fleet parking:	45
.2	DFO required Fleet parking:	- (existing to remain)
.3	Total required Fleet parking:	45

.6 Proposed New EC Fleet parking stalls:

.1	North west lot	45
.2	Total	45 (1 extra for growth)

.7 The proposed parking arrangement above is illustrated on the following pages.





Public Works and
Government Services
Canada

Travaux publics et
Services gouvernementaux
Canada

REAL PROPERTY SERVICES
Western Region

EXISTING STAFF PARKING

NW	54
NORTH	33
SOUTH	106
ANNEX	3
TOTAL	196

Client

1:1000

DEPT. OF FISHERIES & OCEANS
ENVIRONMENT CANADA

FRESHWATER INSTITUTE

project title

WINNIPEG , MANITOBA

titre du projet

approved by

approuvé par

designed by

conçu par

drawn by

dessiné par

PWGSC Project Manager

Administrateur de Projets TPSGC

PWGSC AES Resources
Manager

Gestionnaire Ressources SAG TPSGC

Client

Client

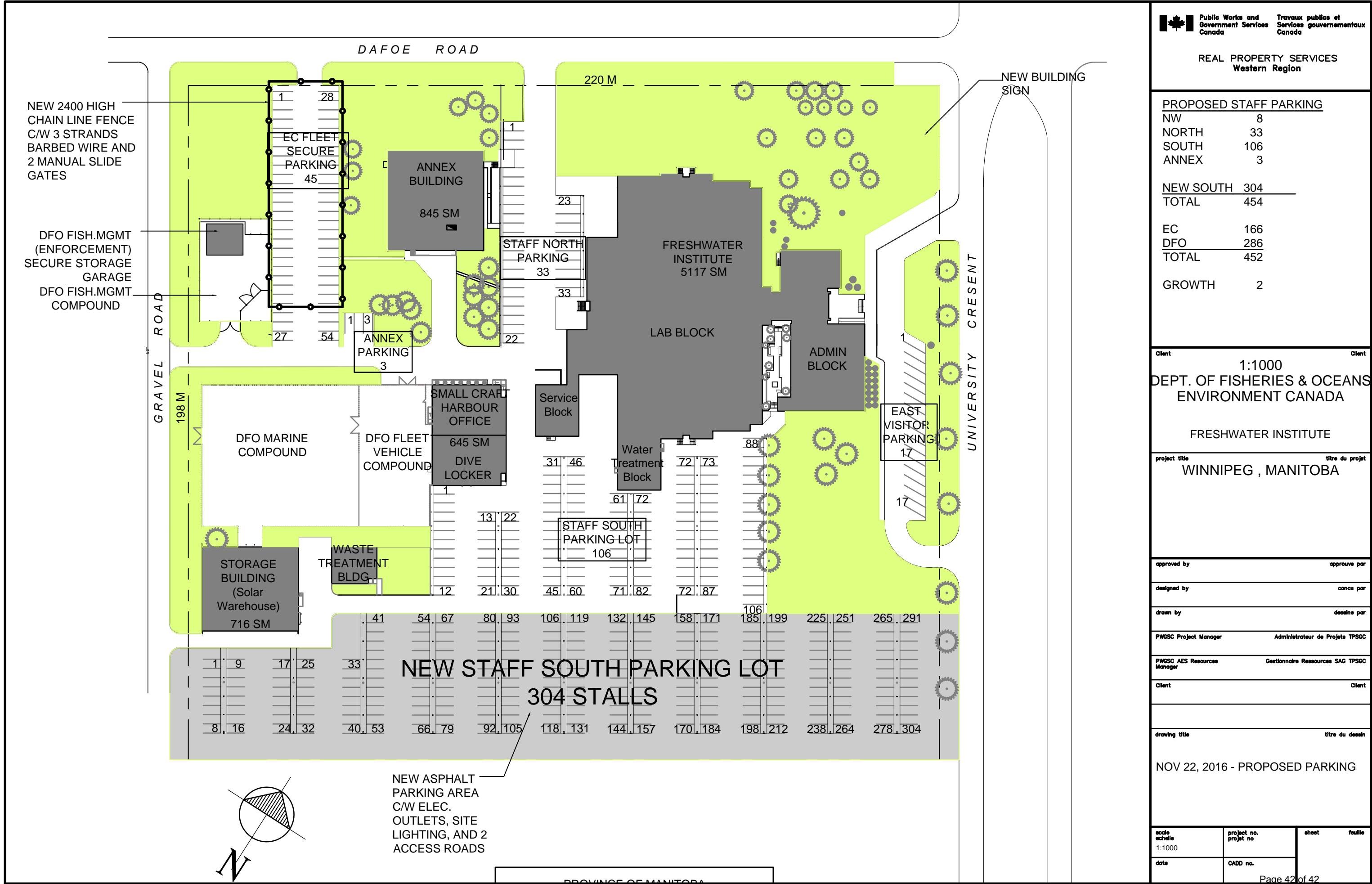
drawing title

OCT 12, 2016 - EXISTING PARKING

titre du dessin

scale échelle 1:1000	project no. projet no.	sheet feuille
date	CADD no.	

Page 41 of 42



REAL PROPERTY SERVICES
Western Region

PROPOSED STAFF PARKING

NW	8
NORTH	33
SOUTH	106
ANNEX	3

NEW SOUTH	304
TOTAL	454

EC	166
DFO	286
TOTAL	452

GROWTH	2
--------	---

Client

1:1000
DEPT. OF FISHERIES & OCEANS
ENVIRONMENT CANADA

FRESHWATER INSTITUTE

project title

WINNIPEG, MANITOBA

approved by

designed by

drawn by

PWGSC Project Manager

PWGSC AES Resources Manager

Client

drawing title

NOV 22, 2016 - PROPOSED PARKING

scale échelle 1:1000	project no. projet no.	sheet feuille
date	CADD no.	