RS 2.1.1 Analysis of Project Scope of Work

Canada Centre for Inland Waters Administration and Laboratory Building Laboratory Modernization Plan (LMP) 2014-10-23

PWGSC Project R.072688.001
Environment Canada
Burlington, Ontario

TABLE OF CONTENTS

RS 2.1.1 ANALYSIS OF PROJECT SCOPE OF WORK

INTENT

The purpose of this stage is to ensure the consultant has reviewed and integrated all the project requirements, identified and evaluated conflicts or problems, provided alternative strategies, presented and received approval on a Project scope, delivery process, schedule and cost estimate required to deliver a cohesive quality project. This approved deliverable will become the Project Scope of Services and will be utilized throughout the project to guide the delivery.

SCOPE AND ACTIVITIES:

The Consultant shall:

- Analyze the Project Brief or the Terms of Reference and advise the Departmental Representative of any noted problems or the need for more information, clarification or direction
- Visit the site and/or buildings and verify the availability and capacity of services needed for the project
- Perform surveys and obtain local information applicable to the design, during the site visit. This includes verifying or preparing as built records as necessary
- Attend project start up meeting
- Analyze the project requirements including but not limited to the space analysis requirements and functional program (when available)
- Review all available existing material related to the project including existing plans and reports that will aid in the work. All such documents must be returned to the Departmental Representative on termination of the contract.)
- Review the proposed project schedule for verification that all milestone dates are achievable
- Review the cost plan or budget for verification that the costs are realistic and achievable
- Identify and verify all authorities having jurisdiction over the project
- Identify the codes, regulations and standards that apply
- Establish a policy for project to minimize environmental impacts consistent with the project objectives and economic constraints
- Review potential for environmental impacts and application of the Canadian Environmental Assessment (CEA) Act
- Identify additional and/or specialized services that may be required to proceed with the project but are not included in the required services of the specific call-up. Advise and recommend to the departmental representative the list of proposed services such as soil testing, equipment testing, material testing, geotechnical analysis or any other services that may impact the design, quality, budget or schedule of the project.

DELIVERABLES:

The Consultant shall:

- Provide a comprehensive summary of the project requirements/program demonstrating understanding of the scope of work including:
- Report on existing base building system elements including their condition, deficiencies and life expectancy.
- Confirmed or adjusted project cost and time plans
- Written identification of the problems, conflicts or other perceived information/clarifying assumptions for the acknowledgment of the project manager/departmental representative.

1.0 Summary of Project

The Canada Centre for Inland Waters (CCIW) hosts staff from Environment Canada's Water Science and Technology Directorate as well as members of the Department of Fisheries and Oceans (DFO) and is Canada's largest freshwater research facility. CCIW also works with other departments such as Canadian Coast Guard. Environment Canada's National Water Research Institute (NWRI) is Canada's pre-eminent freshwater research facility. One of NWRI's two main centres, the CCIW, is home to a successful Federal Buildings Initiative energy efficiency improvement project which seeks to reduce Greenhouse Gas (GHG) Emissions. The facility is located at 867 Lakeshore Road in Burlington Ontario and is one of the world's leading water- research centres. The CCIW complex consists of six inter-connected buildings, most built in the early 1970s in 4 phases, with a total of almost 50,000 square metres of floor space. It is owned and operated by Environment Canada who are the 'Custodial Department' of the CCIW and self-manages the facility.

The CCIW houses the central facilities of the National Water Research Institute (NWRI) and other EC programs, including the Ecosystem Monitoring and Assessment Network (EMAN) coordinating office; Ontario regional offices of EC, including those related to Great Lakes and meteorological programs; and the Wastewater Technology Centre (WTC), specializing in the advancement of environmentally friendly chemistry technologies as well as technologies for the treatment of municipal and industrial wastewater.

Staff working at the CCIW includes aquatic ecologists, hydrologists, toxicologists, physical geographers, modelers, limnologists, environmental chemists and research technicians. The National Laboratory for Environmental Testing at the CCIW has fully accredited environmental analysis capability for a wide range of organic and inorganic chemicals, including a specialization in low level metals and the analysis of organic contaminants. In addition to laboratory research, work carried out at the National Laboratory for Environmental Testing involves engineering and technical operations, such as the planning and management of field sampling programs.

The CCIW main buildings are all located within the building compound and are typically identified as follows:

NWRI Building – multi-storey, heated building, constructed in stages throughout the early 1970's and comprised of the following 5 separate buildings:

1. **Administration & Laboratory (A&L)** – A seven storey building housing the main facility entrance, administrative offices, cafeteria, kitchen, auditorium, library, offices, laboratories. The majority of the laboratories are located on floors 4 to 7 with approximately 3,000 m^2 on each floor (Labs at 1,400m^2 and Office and Common Areas at 1,600m^2). These floors are generally arranged with the laboratories backing on a central service core with staff offices located on the building exterior. The Service Core which contains the plumbing, piping, drainage, and fume hood exhaust risers to the penthouse are centrally located on each floor and back on to the laboratories. The Mechanical Room serving the A&L is located on the 3rd floor and the fume hood exhaust fans and stacks are housed in the Penthouse located above Floor 7.
2. **Research & Development (R&D)** – A two storey building housing offices, laboratories and workshops.
3. **Hydraulics Lab** – A two storey building housing laboratories and offices.
4. **Warehouse** – A two storey building housing workshops, storage areas, shipping/receiving areas, offices, and laboratories.
5. **Boiler Plant** – A one storey building with 2 mezzanine areas housing the main heating equipment for the entire facility.

WTC Building – A two storey, heated building, originally constructed in 1971 with an addition on the east side in 1995, currently housing offices and laboratories, workshops.

Annex Building – A two storey, partially heated building, originally constructed in 1988 with a partial 2nd storey added in 1991, currently housing offices and storage areas.

Building Description

Architectural

We have reviewed the as-built architectural drawings of the NWRI and specifically Floors 4 to 7 of the A&L Building to determine the general condition of the facility and how the existing systems will impact the Laboratory Modernization Plan. While the scope of work for the LMP Project does not specifically extend to the building envelope and exterior building conditions, we will review the overall building with respect to the architectural features to understand where they may impact the planning for the laboratory modernization. The following sections are referenced from the Building Condition Report (BCR) prepared by PWGSC and will be confirmed as part of the **RS 2.2.1** Investigation and Report to follow.

Exterior Walls
The A&L Building is primarily constructed of concrete (cast-in-place) on the north elevation, part of the south elevation, the 3rd floor east and west elevations as well as the auditorium, perimeter columns and perimeter stairwells. Precast concrete with a concrete block back-up and rigid insulation is used on the East and West elevations. Reinforced concrete with a rough board finish is cast integrally with the building structure and interior surfaces are finished with wood strapping and rigid insulation, metal lath and plaster. From the initial investigation, it would appear that the overall R Value of the exterior wall would be minimal. The perimeter stairwells which project as half round structures on the east elevation of the A&L do not have any insulation and are finished with exposed concrete an a rough board finish. A cementitious coating has been added to two of the A&L stairwells (CE and SE). Other exterior materials consist of prefinished metal cladding, insulation, and galvanized metal liner at the A&L roof level Mechanical Penthouse. Painted metal louvres are the main exterior element on the 3rd floor east and west elevations.

Windows
The exterior windows throughout the facility are dark bronze anodized aluminum, fixed type, with insulating glass units. The 4th to 7th floor windows are continuous strip windows on the east and west elevations and partial on the north and south and extend from approximately 900mm above finished floor to approximately 2100mm above floor level. The windows are in acceptable condition, however it is likely that they exhibit a higher rate of air leakage than would be considered acceptable under today's standards.

Interior Construction
The floor finishes vary throughout the building but in general, carpet is used in many offices in the lab areas with vinyl tile used in a majority of laboratories. Some of the upgraded laboratories have sheet vinyl and epoxy is used in Lab L752 on the 7th floor. Ceramic tile is used typically in the washrooms with exposed concrete in Service Cores and enclosed exit stairs.

Interior Partitions
The interior partitions in the 4th to 7th floor laboratories are typically concrete block demising walls between the Corridor and Labs and the Service Core and Laboratories with a mix of concrete block and steel stud/gypsum board between laboratories. Some newer labs have been upgraded to include demountable partitions between units.

Ceilings
The ceilings on floors 4 to 7 are typically suspended metal T-bar with lay-in acoustic tiles, located in offices, open office areas, board rooms/meeting rooms, training rooms, and laboratories. Suspended Acoustic (coffered) with a metal T-bar with lay-in acoustic tiles are located in the conference rooms on Floors 4 through 7.

Interior Doors
Standard door types are used throughout the interior of the facility with hollow metal and pressed steel frames. Solid core wood doors with plastic laminate finish, hollow metal and aluminum frames (for fixed and demountable partitions are also used. Glazing in doors, sidelights and transoms are a mixture of clear and wired glass.

Interior Stairs
The Administration & Laboratory Building has five stairs as follows:

- NW: Cast in place concrete from Ground Floor to Penthouse/ roof and exits to exterior at grade through entrance vestibule.
- NE: Cast in place concrete from Basement to the 7th floor, exits to exterior at grade through entrance vestibule.
- SE: Cast in place concrete from Ground Floor to Roof/Penthouse, exits to exterior at grade through entrance vestibule.
- SE: Cast in place concrete from Ground Floor to 7th Floor, exits to exterior at grade through entrance vestibule.
- CC: Cast in place concrete from Ground floor to the Roof/Penthouse, exits to exterior at grade through main entrance lobby.

Elevating Devices
The A&L Building is serviced by four elevators; two Passenger and two Freight. The passenger elevators are located in the front lobby. Elevator No. 1 serves Floors 1 to 7 and Elevator No. 2 serves Floors 1 to 7 but does not stop at the 3rd Floor. The elevators have an acceptable capacity and rated speed for the facilities that they serve. The main freight elevator has a rated capacity of 3175 kg (7,000 lbs.) with stops from the 1st to 7th floors. The other freight elevator is a smaller unit that just serves the 1st to 2nd floors.

Life Safety and Occupancy
The overall facility is difficult to categorize as a major occupancy type, as defined in the National Building Code of Canada 2010 (NBC), Part 3 due to the complexities and interconnections of spaces. The laboratories, garages, workshops, warehouse and storage functions define the facility as a "Group F - Industrial" major occupancy, the specific level (either Division 1 - High Hazard, Division 2 - Medium Hazard, or Division 3 - Low Hazard) of each area varies depending on specific usage and materials (e.g. chemicals) and equipment involved. The facility also contains several minor occupancies, including Group A, Division 2 - Assembly (cafeteria, auditorium, library); and "Group D - Business and Personal Services (offices, open office areas).

Determination of the occupancy types in each area is at the sole discretion of the Fire Protection Engineering at PWGSC, formerly HRSDC as the 'Authority Having Jurisdiction' in Federal facilities. With five separate structures divided by fire separations, the facility is considered a single building, as it lacks the fire walls and spatial separations required for consideration as multiple buildings.

The capacity of the existing architectural systems will be reviewed in further detail in the Investigation and Report Phase to follow as well as during the Concept Design Phase. We will review the conditions and capacity of the existing infrastructure and advise suitability for the proposed modernization of the Floors 4 to 7.

Structural
We have reviewed the structural framing and the as-built structural drawings of the 4th floor to the roof level. Although the Administration and Laboratory facility was constructed in the early 1970's, there is no mention of the building codes and standards used for the structural design.

The 4th through the 7th floors are comprised of perimeter offices and interior laboratories, arranged around two centre service shafts. The typical structural bay sizes are 20'-8" in the north-south direction x 12'-0" in the east-west direction (the 12 ft span covers the perimeter offices and the corridors between offices and labs). The next east-west structural bay spans 33'-4" across the laboratory. These bay sizes are mirrored across an 8'-0" wide service corridor between two adjacent laboratories.

Typical floor framing is a cast-in-place one way slab supported on concrete beams (where the concrete beams span in the east-west direction). Low strength concrete is used along both sides of the service corridor to allow for changes to through-slab penetrations. The fourth floor is framed with 6" thick one way concrete slab spanning 10'-4" (the 20'-8" north-south structural bay divided by two) and supported

onto 16" wide x 24" deep concrete beams. The floor design live load is 150 psf for the laboratory areas and 100 psf for the perimeter corridors and offices.

The fifth to seventh floors are framed with 4-1/2" thick one way concrete slab spanning approximately 7'-0" (the 20'-8" north-south structural bay divided by three) and supported onto 18" wide x 18" deep concrete beams. The floor design live load is 150 psf for the laboratory areas and 100 psf for the perimeter corridor and offices. Some of the one way slabs have been thickened from 4-1/2" thick to 6" in order to accommodate embedded electrical and service ductwork running parallel to the beams within the slabs.

The roof structure is similar to 7th floor framing with 4-1/2" thick one way concrete slab spanning 7'-0" and supported onto 18" wide x 18" deep concrete beams. The design live load is 120 psf for the mechanical room slab and 40 psf + ASL (accumulated snow load) around the perimeter of the penthouse.

Typical interior concrete columns are 16" square at the top level and increase in size by approximately 2 to 3 inches per floor to 30" square or round at the lower level. Eight inch reinforced concrete stair walls and ten inch thick reinforced concrete shear walls provide lateral stability to the structure. The foundations consist of pilings and pile caps supporting concrete grade beams and walls. A review of a 2009 Condition Report concluded that no deficiencies or recent repairs or modifications have been carried out on the foundations and the substructure. The capacity of the existing structural system will be reviewed in further detail in the Investigation and Report Phase to follow as well as during the Concept Design Phase.

Mechanical

We have reviewed the as-built mechanical drawings of the NWRI and specifically Floors 4 to 7 of the A&L Building to determine the general condition of the facility and how the existing systems will impact the Laboratory Modernization Plan. The following sections are referenced from the Building Condition Report (BCR) prepared by PWGSC and will be confirmed as part of the **RS 2.2.1** Investigation and Report to follow.

Primary Services - Heating
The central heating system for the Administration/Laboratories, hydraulic wet laboratories & offices is provided from a jacket water co-generator loop, a waste feed steam boiler, a direct contact hot water heating boiler, and three steam boilers. The primary equipment and their associated distribution components are located in the Boiler & Chiller Room in the lower Boiler Room, and in the mezzanine Mechanical Room located on the Ground Floor. Each unit is connected respectively to the high/low pressure headers located on the mezzanine Mechanical Room, to the glycol loops, and to the steam/ hot water heat exchangers located in the 3rd Floor Mechanical Room.

Systems and distribution to the A&L is from a high pressure steam main supplied to the 3rd Floor in the Mechanical Room and to other areas of the complex. Perimeter induction units are installed in the A&L Building on 4th to 7th floors. Steam unit heaters are located in the Mechanical Room and in staircase or door areas. The steam to hot water heat exchangers and steam to glycol heat exchangers are located in Mechanical Rooms.

Treated water for the boilers is provided by the Reverse Osmosis system (R.O.) and associated chemical treatment system. The equipment and associated components are located on the 2nd level mezzanine floor. It is understood that the units are maintained by Environment Canada property management. Primary control of the boilers and heating components is controlled and monitored by a Delta Direct Digital Control (DDC) system. Steam-to-glycol heat exchangers are located in the 3rd floor Mechanical Rooms and serve the preheat coils in the air handling units. Variable speed drives have been installed on the primary heating water pumps for enhanced operational efficiency.

It is understood that the existing components of the hydronics heating system are a combination of new and original components with most of the pipes, valves and heating equipment from the original construction, built in 1970.

Cooling
The primary cooling for the A&L Building is provided by two 700-ton centrifugal water chillers located in the Boiler and Chiller Room. The chillers are designed to operate only during the summer season, and use HCFC-123 in the refrigerant circuit. Heat rejection for the main building cooling systems (and cogen) is provided by water from the Harbour. The primary pumps provide the required circulation to secondary condenser water pumps in the Boiler Room which remove heat from chiller (and cogen).

The cooling for the wet laboratories fresh water is provided by two chillers, two air cooled condensers, two cooling plate exchangers, and two heating plate heat exchangers. The forced circulation of the hot and chilled water throughout the systems is provided by centrifugal water pumps. The chillers are located in the lower Boiler Room. The condensers are located on the ground level along the north wall of the Boiler & Chiller Rooms. The plate exchangers are located in Mechanical Room L140.

Secondary Services - Heating/Cooling
Secondary heating of the A&L Building and 4th to 7th Floor areas is by perimeter wall induction units, radiation wall fin units, vestibule fan coil units, steam and hot water unit heaters, glycol coils, hot water coil mounted in the air handling units. All the heating units in the facility are directly reliant upon the existing boilers and cogen, piping and circulating pumps in order to operate as intended. It is understood that the existing components of the hydronic heating system are a combination of new and original with most system pipes, valves and heating equipment from the original construction in 1970.

Primary Air Supply
The air delivery system consists of several air handling units located in the A & L Mechanical Room, and on the roof of the A&L Building. These units supply conditioned and fresh air to the occupied space via air ducts or variable air volume (VAV) boxes installed throughout the facility. The majority of air handling units are typically fitted with inlet/exhaust/bypass dampers, mixing plenum, filters, preheating glycol coil, hot water heating coil, cooling coil , smoke and carbon dioxide detectors, supply and return air fans and low pressure dedicated distribution ducting system. These units use centrifugal type fans for the supply, return and exhaust of the building air. These will be confirmed as part of the RS 2.2.1 Investigation and Report Phase to follow.

The Penthouse Mechanical Rooms also contain the exhaust units dedicated to the laboratory fume hood exhaust units. Fume exhaust ducts are terminated with a cone fitting 3 meters above finished roof. A new Strobic Exhaust system has been recently installed to serve the L752 Ultra Trace Lab on the 7th Floor and it is understood that an additional Ultra Trace Lab is to be added in the future.

Some of the laboratory fume hoods and equipment cabinets in the A&L Labs are ducted and connected to the exhaust fans located in the Penthouse Mechanical Room on the eight floor. The existing exhaust fans are from the original construction in early 1970's with a normal life of 25 - 30 years. These existing fans have exceeded their normal life expectancy and a new Central Exhaust System Study has been commissioned from Filer Engineering to look at how the system can be upgraded. The LMP Project will consider the recommendations in the CESS. It is likely that the LMP will have to look at the complete HVAC system as part of the effective remaining life of the systems.

Domestic Hot Water System
Domestic hot water is generated through one, low pressure steam-to-hot water converter located in the mezzanine floor and cogen with the steam back-up. Booster pumps are located on the 3rd Floor Mechanical Room. The hot water in the building is provided in washrooms, laboratories, janitor closets and cafeteria. The existing storage tank was installed in the early 1970's.

Plumbing System
The plumbing system provides potable water and drainage to the laboratories, washrooms, janitor's closets, refrigerated drinking water fountains, cafeteria and mechanical rooms in the facility. Specialty drainage systems installed for this facility are the grease traps in the cafeteria and a waste water neutralization system for the labs. Typical occupancy and use application is for a combination of labs and office space. The condition of the laboratory piping and waste neutralization will be further reviewed to determine life expectancy.

Local water pressure is boosted by two base mounted pumps to increase the pressure of the domestic cold and hot water from the 5th floor to the 8th floor. The existing systems are complete with flex connections, gate valves, and check valves.

The capacity of the existing mechanical systems will be reviewed in further detail in the Investigation and Report Phase to follow as well as during the Concept Design Phase. We will review the conditions and capacity of the existing infrastructure and advise suitability for the proposed modernization of the Floors 4 to 7. We will consider energy efficient equipment which may benefit the entire building and energy optimization measures as well as renewable energy sources where practical.

Fire & Life Safety

We have reviewed the as-built mechanical drawings of the NWRI and specifically Floors 4 to 7 of the A&L Building to determine the general condition of the facility and how the existing systems will impact the Laboratory Modernization Plan. A more through report will follow as part of the RS 2.2.1 Investigation and Report but we can advise the following.

Water Supply, Standpipes, Fire Hoses
Fire hoses in cabinets are installed throughout the facility. Portable extinguishers were installed in each cabinet. The A&L is fitted with standpipes and fire hoses installed in recessed wall mounted cabinets.

Sprinkler System
There are no sprinkler systems in the A&L Building and it is understood that Fire Protection Engineering have issued recommendations to have a sprinkler system installed or provide alternate means of maintaining life safety. It is understood that a separate study is being undertaken and the LMP Project will coordinate with the recommendations as part of the overall strategy for the CCIW modernization.

Electrical

We have reviewed the as-built electrical and communications drawings of the NWRI and specifically Floors 4 to 7 of the A&L Building to determine the general condition of the facility and how the existing systems will impact the Laboratory Modernization Plan. The following sections are referenced from the Building Condition Report (BCR) prepared by PWGSC and will be confirmed as part of the RS 2.2.1 Investigation and Report to follow.

Electrical Power
The main power to the CCIW facilities is supplied from the Local Distribution Company at 27.6 kV via an underground cable and duct bank configuration to the high voltage compound located at the southwest corner of the facility. The main conductors enter a main 600 A, 27.6 kV outdoor switchgear unit which feed three (3) 600 A, 34 kV, load break switches. Each load break switch supplies primary power to three transformers. These transformers provide power into the facility via parallel runs of TECK cable installed on a cable rack system into the main 600 volt switchboard within the main Electrical Room. Transformer feeds terminates at 4000 amp rack style breakers, located within the main switchboards.

The current low voltage (600 V) distribution within the main building is engineered from the original design to provide double redundancy from transformers throughout the facility via twin switchboards located in the main Electrical Room. The main distribution boards located throughout the main building are compartmented in two halves and are fed as such. These provide power to main distribution switchboards and a tie breaker with key interlock devices in stalled to operate the switchboard from feeders. The main laboratory distribution substation is located in the 3rd floor A&L (east) Mechanical area. Power is further distributed to individual areas of the main facility with 120/208 voltages utilized in office and general power requirement areas supplied from local step down, dry type transformers and small panel boards of various ratings. Panel boards for lighting and receptacle loads are located within corridor, office and riser areas.

The A&L main distribution substation feeds a 400A, 600V, MCC and 120/208 volt distribution panels by a 1000 kVA transformer, regular power supply source to the laboratory emergency power transfer switch and a 120/208 volt distribution panel by a 1000 kVA transformer and Motor Control Centers.

The 120/208 voltages in the A&L Office and Laboratory areas are supplied from the 3rd Floor east main 120/208 distribution boards and small panel boards of various ratings located throughout this area of the facility. Panel boards for lighting and receptacle loads are located within corridor, office and in each lab room area.

Branch wiring consists of two different systems. For lighting, the wiring is fed from panel boards, with conduit home runs to junction boxes and then from fixture to fixture with armoured cable in the ceiling space or EMT conduits for surface applications. For receptacles, armoured cable drops are run through walls to flush mounted devices and EMT conduits are used for exposed applications. Down feed service pack poles are utilized in office areas of the facility. The system and condition will be reviewed in more detail in the Investigation Phase to determine how they impact current and future operations.

Emergency Power

The facility is equipped with a Kohler 605 kW (756 kVA, 600/347v) diesel powered emergency generator, located in the Emergency Generator Room in the Boiler Room area and feeds a main 500A transfer switch located outside the room. From the main transfer switch, power is supplied to a main 600V emergency power distribution switchboard, which in turn provides power to five secondary transfer switches located throughout the facility. The Main Lab area is fed from the 3rd Floor Mechanical east area.

The generator provides power by distribution panels and panel boards for emergency lighting, building mechanical equipment, fire alarm system and some of the A&L operational labs as well as UPS and other equipment. It is understood that CCIW would like to separate the tenant loads from the emergency generator and provide backup power from the Co-Generation unit. This Co-Gen will be retooled to operate to ensure consistent backup power is provided.

An 810 kW, 600V, Co-Generator is also located within the complex. This unit is installed within the Boiler Room area outside the Emergency Generator Room. The Co-Gen unit currently supplies power back to the main 600 V distribution board located within the Main Electrical Room. The Co-Gen also provides heat recovery to mechanical systems. As part of the Investigation, it should be determined how the operation of the emergency power will impact the future LMP Project especially with respect to emergency lighting and maintaining critical systems in the laboratories.

Interior Lighting

Interior lighting in the A&L Building is provided from a variety of fixtures with fluorescent fixtures, both recessed and surface mount, containing T8 lamps and electronic ballasts in offices areas. In Laboratory areas there are a variety of fluorescent fixtures, both recessed and surface mount, containing T8 lamps and electronic ballasts. Some laboratory areas contain explosion proof fixtures and fittings with incandescent style lamps, operating at 120 volts and controlled by local wall switches and building automation. The stairwells have varying types of fluorescent fixtures, suspended and surface mount, containing T8 lamps and electronic ballasts.

Emergency Lighting

The emergency lighting is provided from emergency panels fed from the in-house generator via step down transformers. The emergency panels supply power to dedicated fluorescent and industrial fixtures located throughout the building. Emergency lighting battery pack, two lamp units and remote heads are located in some mechanical, electrical and stairwell areas. In accordance with the Canada Labour Code and NBC, emergency egress and exit routes shall be illuminated at all times with a minimum of 10 lux average lighting levels. The status of emergency lighting will be reviewed to verify lighting levels for these areas.

Exit Lighting

Exit lighting throughout the A&L Building is a mixture of different types and styles of fixtures. A complete review of the exit lighting will be undertaken as part of the RS 2.2.1 so that all lighting meets the requirements of the National Building Code 2010 and the Treasury Board standards for size, type and official language.

Fire Alarm System
The A&L Building is equipped with an Edwards, two stage, multi-zone fire alarm main panel which monitors heat and smoke detectors, manual pull stations, sprinkler flow, anti-tamper devices on control valves, and fire suppression systems located in special areas. Upon activation, alarm bells and mag lock door closures are activated and HVAC shutdowns occur. The main fire alarm system incorporates a voice communication system that consists of speakers installed throughout floor spaces and emergency telephones located at each stairwell area. The main control is provided by a fire alarm control computer and software package rack mounted in a separate cabinet located within the Maintenance Control Room at the front entrance of the facility.

Security System
The security for the A&L facility is provided by monitored door contacts via a Delta card access system, with CCTV cameras connected to monitors, switchers and digital recording equipment and a 24/7 security posting. Camera monitors and control are located within the security desk area. Discussions will be held with CCIW staff during the Investigation and Feasibility Phases to determine the required level of security and monitoring required as part of the LMP.

Telephone & Communications System
The main telephone line enters the A&L Building via underground cables to the 2nd Floor Main Telephone Room located at the south end of the mall area. The front end equipment is a Nortel Networks System with distribution by a multi-line BIX board type installation for phone lines and fibre optic cables to the main computer room areas. Telephone lines are installed to distribution cabinets and rooms on floor areas which provide service to end user locations by zone conduits and open plenum area wiring.

A Main Computer Room is located on the first floor area adjacent to the Main Lobby and Mall areas. The majority of communications for the facility is connected to this location. LAN towers and rack mounted computer equipment located within the Main Computer Room provide communications to all floors via conduit risers and fibre optic trunk lines to local LAN racks installed in mechanical core, communication closet and tenant areas. A review of existing telephone and communication systems will be undertaken to determine the future requirements for the LMP Project.

The capacity of the existing electrical and communication systems will be reviewed in further detail in the Investigation and Report Phase to follow as well as during the Concept Design Phase. We will review the conditions and capacity of the existing infrastructure and advise suitability for the proposed modernization of the Floors 4 to 7. We will consider energy efficient equipment which may benefit the entire building and energy optimization measures as well as renewable energy sources where practical.

Laboratories

The laboratories for the A&L Building are generally located on the 4th to 7th floors with some additional labs and research areas located on the 1st and 2nd floors. The upper floor labs occupy approximately 1,400m^2 per floor with Office and Common Areas occupying approximately 1,600m^2. There are approximately 115 designated laboratories on the four floors and these are fairly evenly distributed and range from 25 to 31 labs per floor. There are also approximately 50 Offices on each floor as well as some additional support spaces such as Copier Rooms, Kitchenettes and Washrooms. These floors are generally arranged with the laboratories backing on a central service core with staff offices located on the building exterior. The Service Core which contains the plumbing, piping, drainage, and fume hood exhaust risers to the Penthouse on the 8th Floor are centrally located on each floor and back on to the laboratories.

The laboratory section also includes support spaces such as Wash Up & Sterilization Rooms, Cold Rooms, Technician Support Areas and Bottle Wash Areas. The laboratories use a standard 24 feet (7.6m) depth from the Corridor demising wall to the Service Core walls with exhaust and fume hoods generally located on this Service Core wall. All access to the labs is from the Corridor side with the exception of a single door on each of the South Service Cores into an adjacent lab. This may have been provided to eliminate a dead end corridor at this location. All other Service Cores are accessed from the Corridors.

The labs do not have a standard width and vary from 10'-3" (3.12m) to 31'-0" (9.45m) with 20'-8" (6.30m) being the most common size. A number of labs are interconnected by doors or open to an adjacent laboratory. There do not seem to be any laboratories that have a dedicated office within the suite with all Research Offices located on the exterior of the building.

It is understood that approximately 25% of the laboratories have been renovated or upgraded since the building was completed in the early 1970's and have more up to date fume hoods and modular laboratory furniture. It was also noted that many of the Analytical Labs are located on the 7th Floor with Research Labs generally located on Floors 4 to 6 with some on the 7th Floor. The Analytical Labs include the L719/L721 Liquid Chromatography-Mass Spectrometry and L724/l725 Mass Chromatography & Gas Chromatography Labs which adhere to the Canadian Association of Laboratory Accreditation (CALA) standards.

A new L752 Ultra-Trace Laboratory has recently been completed which has its own air-handling system, up to date equipment and fume hood with a separate strobic exhaust system. It is understood that another Ultra-Trace Laboratory is to be provided on this floor.

The condition and capacity of the existing laboratories systems will be reviewed in further detail in the Investigation and Report Phase to follow as well as during the Functional Programming and Concept Design Phases to follow.

2.0 Project Scope and Objectives

The scope of work for the A&L LMP Project is generally as follows:

- Review and assess the existing conditions of entire space from Floors 4 to 7 of Administration & Laboratory (A&L) Building and other areas where affected and any other conditions that may require work to ensure safety of the facility and its occupants;
- Review the existing documents and reports, maintenance history and concerns, potential impact on the existing systems, and health and safety requirements;
- Meet with and interview user groups to identify and evaluate their current and future requirements and to develop a plan / strategy for modernizing the laboratory spaces and recapitalizing other areas from Floors 4 to 7 of the A&L Building;
- Review and identify Environment Canada's current projects in planning, design, and construction phases at the CCIW and to integrate them into the plan which includes options, recommendations, and cost analysis.

The following items are not part of the scope of work for the A&L LMP Project:

- Study and Planning for air handling units, roofing, and building envelop
- Sprinkler Study
- Study and Planning for Central Exhaust Systems, however, review of Filer Engineer Ltd.'s report is required
- Life Cycle Cost Analysis

It should be noted that while the Scope of Work for the Laboratory Modernization Plan of the A&L Laboratories is restricted to Floors 4 to 7, the understanding and implementation will take into account other areas that are peripheral to and associated with the Labs where they impact the long term operation.

3.0 Start Up Meeting and Site Visit

A Project Start up Meeting and Site Visit was held on October 07, 2014 at the CCIW A&L Building. The purpose of the meeting was to introduce all the stakeholders and design team and to undertake an initial review of the facilities. A more thorough Investigation and Report will be undertaken in a subsequent phase under the Required Services for the project.

Representatives from PWGSC and Environment Canada who participated:

- Krista Choi, PWGSC Project Manager responsible for the project
- Adam Kurz , EC RPMD, Manager, Engineering Capital Projects & Assets
- David Dautovich; EC RPMD, Project Leader
- Rod Khaled, Environment Canada, Facilities & Property Management
- Carol Perry, EC WSTD, Chief of Finance and Administration

Representatives from DIALOG who participated:

- Jim Goodwin, Architect, Principal and Laboratory Specialist
- Steven Ploeger, Architect and Laboratory Specialist
- Naresh Arora, Principal Electrical Engineer
- Daria Khachi, Principal Structural Engineer
- Raul Dominguez, Lead Mechanical Engineer
- Charles Marshall, Engineer and Sustainable Design Lead
- Robert Northcott, Architect and Project Manager

During the site visit the Design Team was escorted through areas of the A&L Building by CCIW Staff and allowed to ask questions and take photographs. Areas visited included the Ground Floor Mechanical & Electrical Rooms where boilers, chillers and emergency generator are located. The South Penthouse Level Mechanical Room which contains the fume hood exhaust fans and other equipment was visited; a series of existing and renovated labs on 7th Floor South including observing a new Ultra Trace lab; a number of 6th Floor South Labs including access to the Service Core between labs and typical research staff offices and common areas. Further investigation will be undertaken in the next phase.

4.0 Investigation and Follow Up Reports

As part of the Required Services for the A&L LMP, DIALOG will undertake an Investigation and Report Phase to better understand the existing building conditions of the entire area on Floors 4 to 7 of Administration & Laboratory (A&L) Building, as well as the supporting floors and Mechanical and Service Spaces. This will be undertaken to ensure that all conditions which impact the planning of the Laboratory Modernization plan are understood and included in the Concept Design and Cost Plan. Areas that will be addressed include the conditions that may require work to ensure safety of the facility and its occupants, life expectancy of the building system or components, the cause of any problems encountered such as water leakage, structural defects or malfunctions of mechanical and electrical systems. The Report will record the conditions and provide recommendations for the repairs or generate options for the future investment and modernization of the A&L Building.

It is understood that a number of renovations and upgrades have taken place since the building was completed in the early 1970's and that these will all have to be verified by the design team. It is understood that approximately 25% of the existing laboratory areas have been renovated or upgraded during the interim and the impact of these changes will have to be taken into account during the Programming and Design Phases to follow. This is especially important so that the design team understands the existing priorities and capabilities of the CCIW users and the on-going and future direction of analytical and research that will be undertaken.

It is expected that the Investigation will be undertaken by a team of 4 to 5 technical staff from DIALOG during the first and second weeks of November 2014 and will be assisted by CCIW staff to facilitate access to laboratories and other restricted spaces. The Investigation phase will require review of all available documentation for the facility (noted in Section 12.0) which includes existing drawings, Building Condition Reports (BCR) and Asbestos Assessment Report provided by PWGSC. The Final Report

which is expected to be completed by December 02, 2014 will record the findings of the Investigation and provide a description of the condition and design capacity of the building systems, especially the laboratories to enable the design team to prepare the final Concept Design Report with options, Cost Plan and future phasing strategy for PWGSC for the Administration and Laboratory Building LMP.

5.0 Project Schedule

The Project Schedule is based on the Required Services identified in the Consultant Terms of Reference prepared by PWGSC. A Preliminary Project Schedule dated October 06, 2014 is included as Appendix A to this report and identifies the following major milestones:

- PWGSC Approval to Proceed September 25, 2014
- Project Start Up Meeting October 07, 2014
- Analysis of Project Scope of Work Oct 10 – Oct 28, 2014
- Investigations and Reports Oct 28 – Dec 02, 2014
- PWGSC/EC Review Dec 03 – Dec 09, 2014
- Functional Programming Dec 10 – Jan 20, 2015
- PWGSC/EC Review Jan 21 – Jan 27, 2015
- Feasibility Study Feb 03 – Feb Mar 04, 2015
- PWGSC/EC Review Mar 05 – Mar 11, 2015
- Concept Design (Lab Modernization Plan) Mar 17 – Jun 16, 2015
- PWGSC/EC Review Jun 17 – Jun 23, 2015
- Project Completion End of June 2015

The Project Schedule identifies the proposed dates for deliverables required under the Terms of Reference, Review Periods by PWGSC/EC as well as proposed meeting dates with clients and user groups. We have reviewed the schedule and based on our understanding of the project and start up meeting with PWGSC and EC believe that the milestone dates are realistic and achievable.

6.0 Cost Plan

No budget costs for any work associated with the A&L LMP Project have been determined at this time. The Cost Plan for the A&L LMP Project under this scope of work will be undertaken by Hanscomb Ltd. under the direction of a Senior Cost Estimator. The estimating will be summarized in an agreed elemental format acceptable to PWGSC such as those defined by the Canadian Institute of Quantity Surveyors (CIQS) and will include a Master Format Trade Summary. A Project Cost Subdivision which estimates the cost of each phase of construction as applicable will be provided depending on the Concept Design for the options identified by PWGSC. These may include costs associated with a multi-year phased construction project with escalation contingencies and further costs associated with work that is not directly related to Floors 4 to 7, such as infrastructure upgrades. The completion of the Concept Design will include a Class "C" Cost Estimate prepared at a level of detail commensurate with the available information using elemental and additional detailed costs.

7.0 AHJ, Accessibility, Health & Safety, FHBRO, Hazardous Substances

No inquiries have been made to any Authorities Having Jurisdiction (AHJ) or other agencies as part of the Project Analysis at this time including Fire Protection Engineers with PWGSC or other authorities. As part of the scope of work during the Investigation and Report and subsequent Phases including Concept Design, we will contact these agencies through PWGSC to understand any life safety issues, health and safety issues or other issues which will impact the proposed LMP. Specific areas that will be addressed as part of the Required Services include:

Fire, Life Safety and Accessibility

The Project Analysis has not reviewed all building code and life safety issues in the A&L Building but based on the information available, it is expected that if the project was to proceed to construction it will be required to meet current Canada Labour Code (CLC); Canada Occupational Health and Safety Regulations (COHS Regulations); National Building Code (NBC) 2010 or National Fire Code (NFC) 2010 requirements for exiting, fire separations and fire resistance ratings. There may be safety issues with respect to the Treasury Board Fire Protection Standards which do not meet the recommended standards. These code and life safety issues will be reviewed in the design stages to follow and in consultation with Fire Protection Engineers with PWGSC.

It is apparent as part of the initial review of the facilities and available documentation that there are an number of areas that do not meet the current standard for accessibility in accordance with Treasury Board of Canada, Accessibility Standard for Real Property – "*Accessible Design for the Built Environment – CAN/CSA B651-2012".* In order to meet these accessibility standards, a number of renovations and changes would be required. These will be developed during consultation with PWGSC and User Groups; foremost among these discussions will be accessibility and reasonable accommodation of staff with disabilities while maintaining the safety, security and operational effectiveness of laboratory equipment and processes.

While the project falls under the jurisdiction of the federal government and may not be required to meet all provincial regulations, consideration should be given to the *Accessibility for Ontarians with Disabilities Act (AODA)* mandate that all facilities meet the requirement for accessibility and the removal of barriers for all citizens and provide for an enhanced quality of the environment for services and work. We will review these standards with PWGSC as part of the Feasibility and Concept Design Phases to determine if these requirements are applicable to the A&L LMP Project.

As the full impact of Fire, Life Safety and Accessibility is unknown at this time and codes and standards change over the project delivery timeline, we propose to include this as part of the **RS 2.2.9 Risk Management** deliverables which will identify these as potential risks based on past experience and the probability that it could have an impact on schedule or costs of the LMP.

Health and Safety

It is expected that if the project was to proceed to construction it will be required to meet current Federal and Occupational Health and Safety Act and Regulations and Environmental Acts and Regulations which fall under the Canada Labour Code (CLC); Canada Occupational Health and Safety Regulations (COHS Regulations) which are applicable to Health and Safety of staff and the public. In addition to the CLC and COHS codes and regulations, there are a number of other regulations and guidelines which will be directly applicable to any modernization of the A&L Building Laboratories. These include the *'Canadian Biosafety Standards and Guidelines for Facilities handling Human and Terrestrial Animal Pathogens, Prions and Biological Toxins* and the *"Lab Standard Space Standards & Design Guidelines – Draft*" prepared by Health Canada and the Public Health Agency of Canada (PHA). Referenced Codes, Standards and Guidelines applicable to the LMP project are referenced in **Section 8.0**. Provincial Acts and Regulations such as workers safety and environmental protection will also have to be met as part of the design and construction of the LMP.

Federal Heritage Building Review Office (FHBRO)

It is our understanding that Federal government policy requires that all Crown-owned buildings which meet the following criteria must be submitted to FHBRO for evaluation:

- The building is 40 years of age or older (federal departments may make special evaluation requests for buildings that are less than 40 years old, but are not required to do so);
- The building is owned, or being considered for purchase, by a federal department (excludes crown corporations); and

- The building can contain or shelter human activities, has an interior space, an exterior shell and a roof, and it is fixed in a permanent specific location (excludes, in particular, archaeological resources and ruins).

Buildings are evaluated using a point system on the basis of historical associations, architectural value and the building's environment (site, setting and landmark status). There are two classes of Federal Heritage Building: the higher Classified Federal Heritage Building and the Recognized Federal Heritage Building.

Once a building has been designated a Federal Heritage Building, the Custodial Departments is required to:

- Consult FHBRO before undertaking any intervention that could alter the heritage character of a Classified Federal Building;
- Obtain appropriate conservation advice before undertaking an intervention that could alter the heritage character of a Recognized Federal Building; and
- Consult FHBRO before demolishing, dismantling or selling any Federal Heritage Building

It is understood that the facility has not been reviewed by the FHBRO as of this date. It is further understood that as this facility is approximately forty years old (or will be if construction is undertaken in the next several years) that it will exceed the Federal policy. At this time it would be difficult to determine if the CCIW A&L Building would meet the FHBRO criteria for evaluation as a Federal Heritage Building but it should be understood that a FHBRO designation of the A&L could have an impact on the proposed modernization. We propose to include this as part of the **RS 2.2.9 Risk Management** deliverables to identify this as a risk event based on past experience and probability that it could have an impact on the schedule or costs of the LMP.

Hazardous Substances

Due to the age of the building it is expected that hazardous materials as described by applicable Federal and Provincial Regulations will be found. It is possible that a Designated Substances Survey (DSS) will find the following:

- Asbestos
- Lead
- Mercury
- Silica
- Polychlorinated Biphenyls (PCB)
- Mould or microbial contaminants

These are typically found in the following materials:

- Chrysotile asbestos in vinyl floor tiles and mastic
- Lead in wiring, conductors and solder
- Lead in paint finishes
- Mercury vapour in fluorescent lamps
- Free crystalline silica present in concrete, mortar and common building materials

An Asbestos Assessment of the CCIW was undertaken by Pinchin Environmental on behalf of Environment Canada in July 2013. The assessment established the location and type of Asbestos Containing Materials (ACM) present in the building that was apparent to the surveyors and is noted in the Report prepared for EC. It should be noted that this assessment was undertaken by EC as part of their long term management of the asbestos and is not intended for construction nor renovation purposes. The Asbestos Assessment Report indicates the following:

Asbestos was confirmed or visually presumed to be present in the following building materials:

- Texture finish
- Pipe insulation
- Mechanical insulation
- Duct insulation
- Plaster
- Drywall joint compound
- Asbestos cement (Transite)
- Vinyl sheet flooring
- Vinyl floor tiles
- Bakelite

If these materials and others identified by a DSS are present they will typically be removed as part of the renovation of the building and in accordance with acceptable environmental remediation practices. Prior to any planned demolition or renovations a more through and an intrusive investigation for designated substances should be conducted in accordance with the Ontario Occupational Health and Safety Act, Section 30, to determine the location and amount in accordance with Regulations in effect at that time. We propose to include the potential of Designated Substances as part of the **RS 2.2.9 Risk Management** deliverables to identify this as a potential risk based on past experience and probability that it could have an impact on schedule or costs of the LMP.

8.0 Codes, Regulations, Standards and Guidelines Applicable to Project

There are a number of Codes, Regulations, Standards and Guidelines that are applicable to the design and construction associated with the CCIW A&L Building and in particular the LMP project and include the following:

Codes

- The NRC National Building Code of Canada 2010
- The NRC National Fire Code of Canada, 2010
- The NRC National Plumbing Code of Canada 2010
- The NRC Model National Energy Code for Buildings 1997
- The Canadian Electrical Code
- The Canada Labour Code
- The 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 (CCME, 2003)
- International Mechanical Code – Latest Version
- Canadian Standards Association
- CSA B51-09 Boiler, Pressure Vessel and Pressure Piping Code
- CSA B52-05 Mechanical Refrigeration Code
- CSA B139-09 Installation Code for Oil Burning Equipment
- CSA B149.1-10 Natural Gas and Propane Installation Code

Regulations

- The Canada Occupational Health and Safety Regulations
- Federal Hydrocarbon Regulations…
- Ontario Occupational Health and Safety Act, Section 30,
- Ontario Provincial and Municipal Acts, Codes, By-laws and regulations appropriate to the project

Standards

- Standards and Directives of the Treasury Board (TB):
- Accessibility Standard for Real Property;
- Fire Protection Standard;
- Labour Canada's, Fire Commissioner of Canada Standards including;
    - FC-301 Standard for Construction Operations, June 1982
    - FC-302 Standard for Welding and Cutting, June 1982
    - FC-311 Standard for Record Storage, May 1979
    - FC-403 Fire Protection Standard for Sprinkler Systems, November 1994

Labour Canada's, Technical Documents including;

- Fire Protection for Information Technology Facilities and Equipment
- National Fire Protection Association (NFPA)
- NFPA 10; Standard for Portable Fire Extinguishers - 2010
- NFPA 13; Standard for Installation of Sprinkler Systems - 2010
- NFPA 14; Standard for Installation of Standpipe and Hose Systems - 2010
- NFPA 30; Flammable and Combustible Liquids Code
- NFPA 45; Standard on Fire Protection for Laboratories Using Chemicals
- NFPA801 – Facilities Handling Radioactive Materials
- NSF 49 – Biological Safety Cabinet Standards
- NFPA 99 – Fire Protection for Health Related Laboratories

Canadian Standards Association, ANSI, ASHRAE, ASME, ASTM

- CSA B64-01 Backflow Preventers and Vacuum Breakers
- CSA Part 1, C22.1-06
- CSA Standard Z316.3-95 - BSC
- CSA Z316.594 – Fume Hoods and Associated Exhaust Systems – Health Care Technology
- CSA Z316.5 Fume Hoods and Associated Exhaust Systems
- CAN/CSA – Z318.2 – 95, Commissioning of Control Systems in Health Care Facilities
- CAN/CSA – B64.10-94 – Manual for the Selection, Installation, Maintenance and Field Testing of Backflow Prevention Devices
- SMACNA – HVAC Air Duct Leakage Test Manual
- CAN/CSA-C22.2 No. 214-94 "Communications Cables"
- J-STD-607A Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, ANSI-J-STD-607-A-2002
- Telecommunications Industry Association (TIA)
- Commercial Building Telecommunications Cabling Standard
- Part 1: General Requirements, TIA/EIA-568-B.1.
- Part 2: Balanced Twisted Pair Cabling Components, TIA/EIA-568-B.2.
- Pathways and Spaces, ANSI/TIA/EIA-569-B
- Optical Fibre Cabling Components Standards, TIA/EIA-568-B.3
- Optical Fibre Cabling Components Standard Addendum 1 - Additional Transmission Performance Specifications for 50/125 µm Optical Fibre Cables, TIA/EIA-568-B.3-1.
- Telecommunications Infrastructure Standard for Data Centres TIA-942.
- ANSI/AIHA Z9.5, Laboratory Ventilation
- ANSI Z358.1, Emergency Eyewash and Shower Equipment
- ANSI/AWS D9.1 – 90 – Sheet Metal Welding Code
- ANSI 510 – Testing of Nuclear Air Treatment Systems
- Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA) Standards;
- SMACNA HVAC Duct Construction Standards
- SMACNA HVAC System Duct Design
- SMACNA Air Duct Leakage Test Manual
- Seismic Restraint Manual Guidelines for Mechanical Systems
- SEFA 1.2, Scientific Equipment & Furniture Association

Guidelines

- Lab Standard Space Standards & Design Guidelines – Draft prepared by Health Canada and the Public Health Agency of Canada (PHA)
- Canadian Biosafety Standards and Guidelines for Facilities Handling Human and Terrestrial Animal Pathogens, Prions and Biological Toxins-First Edition 2013
- National Institute of Health – Guide for the Care and Use of Laboratory Animals
- LABS21, Environmental Performance Criteria
- Public Works and Government Services MD Guidelines (Latest Edition)
- MD 15161; Control of Legionella in Mechanical Systems
- MD 15000; Mechanical Environmental Standards for Federal Office Buildings
- MD 15116; Computer Room Air Conditioning Systems
- MD 15126; Guide for Laboratory Heating, Ventilation and Air Conditioning (HVAC)
- MD 15128; Minimum Guidelines for Laboratory Fume Hoods
- MD 15129; Perchloric Acid Fume Hoods and Their Exhaust Systems
- MD 15166; Guidelines for Building Owners, Design Professionals and Maintenance Personnel
- MD 250005; Energy Monitoring and Control Systems Design Guidelines

- MD 16001; Air Filters for HVAC Systems
- CDC - Biosafety in Microbiological and Biomedical Laboratories

Canadian Standards Association, ASHRAE, ANSI

- CAN/CSA-T528-93, "Design Guidelines for Administration of Telecommunications Infrastructure in Commercial Buildings", Canadian Standards Association
- American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE), including but not limited to;
- ASHRAE Laboratory Design Guide
- ASHRAE 110 – Method of Testing performance of Laboratory Fume Hoods
- ASHRAE Applications Handbook - 2007
- ASHRAE HVAC Systems and Equipment Handbook – 2008
- ASHRAE Fundamentals Handbook – 2009
- ASHRAE Refrigeration Handbook - 2010
- ASHRAE 52.2 Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size - 2007
- ASHRAE 90.1, Energy Efficient Design of New Buildings - 2010
- ASHRAE 105: Standard Method of Measuring and Expressing Building Energy Performance
- ASHRAE 111; Practices for Measurement, Testing, Adjusting and Balancing of Building HVAC&R Systems
- ASHRAE 114; Energy Management Control Systems Instrumentation
- ASHRAE 135; BACnet: A Date Communication Protocol for Building Automation and Control Networks.
- ANSI/ASHRAE 62.1, Ventilation for Acceptable Indoor Air Quality - 2010
- ANSI/ASHRAE 55, Thermal Environmental Conditions for Human Occupancy - 2004
- ACGIH – America Conference of Governmental Industrial Hygienists, Industrial Ventilation: a Manual of Recommended Practice
- All system sizing and proposed alternatives must be supported by good laboratory practice as outlined in the PWGSC Guide: MD 15126 - 2014; Guide for Laboratory Heating, Ventilation and Air Conditioning (HVAC).
- Fume hood locations should be as per recommendations from CSA Z316.5-94, Fume Hoods and Associated Exhaust Systems
- PWGSC Policy on Seismic Restraint of Existing Buildings

Accessibility

Treasury Board of Canada, Accessibility Standard for Real Property – "Accessible Design for the Built Environment – CAN/CSA B651-2012.

9.0 Sustainable Development and Environmental Impact

The Federal Sustainable Development Strategy (FSDS) fulfills the requirements of the *Federal Sustainable Development Act* by rendering environmental decision-making more transparent and accountable to government. The FSDS establishes a framework for sustainable development planning and reporting with three key elements:

- An integrated, whole-of-government picture of actions and results to achieve environmental sustainability;
- A link between sustainable development planning and reporting and the Government's core expenditure planning and reporting system; and,
- Effective measurement, monitoring and reporting in order to track and report on progress to Canadians.

The FSDS brings together goals, targets and implementation strategies which have been created through the normal course of government decision-making. The FSDS itself does not establish new goals and targets, with the exception of those for greening government operations (GGO), rather it makes the outcomes of decision making more transparent. Goals, targets, and implementation strategies are organized under four priority themes:

I. Addressing climate change and clean air,
II. Maintaining water quality and availability,
III. Protecting nature, and
IV. Shrinking the environmental footprint

The FSDS focuses on environmental sustainability as a first step in integrating environmental concerns with economic and social considerations and sets in motion a process that will over time improve the way in which environmental, economic and social issues are considered. The FSDS is structured to report on what measures have been taken to address sustainable development, and which priorities remain to be addressed.

For the CCIW A&L LMP project, it is proposed that the design team will develop a project-specific approach to sustainability, energy performance and environmental impact. This strategy will address the goals and priorities established in the reference documents and incorporate meaningful feedback gained during consultation. At a minimum we will incorporate the following:

- Best practices for labs, offices and building retrofits to save energy and minimize the Greenhouse Gas Emission (GHG) footprint
- Reuse and recycle existing building materials as appropriate, including a plan for reduction of construction wastes
- Incorporate green materials for new construction including recycled content, local materials and appropriately sourced wood products
- Reduction in potable water use

Further strategies will be investigated through consultation and the Integrated Design Process (IDP) during the Feasibility and Concept Design Phases which could include:

- Provide sustainable design opportunities, strategies, preliminary budgets (i.e. energy, water, waste, etc.). Demonstrate life cycle costing for a sustainable design allowance to demonstrate that investment in sustainable technologies and processes return a value to PWGSC.
- Identify which LEED efficiency credits, energy credits, material credits, indoor environmental quality credits could be pursued. For those credits identified, provide a short description on how they will be achieved
- Review and confirm the proposed assessment of Sustainable Development Design standards to be applied to the project, such as to achieve LEED or Green Globes certification.

The planning of the laboratories and office spaces for the A&L LMP Project should be designed to a high level of efficiency, with low energy consumption. Above and beyond any required LEED rating, the project should incorporate principles and strategies as specified in LABS21 Environmental Performance Criteria (EPC). The Labs21 Environmental Performance Criteria (EPC) is a rating system for use by laboratory building project stakeholders to assess the environmental performance of laboratory facilities. The EPC leverages and builds on the Canadian Green Building Council's LEED™ Rating System, extending it to set appropriate and specific requirements for laboratories. EPC credits may qualify as 'Innovation' credits under the LEED program. LABS21 does not provide a certification process for EPC. The Consultant is required to provide a spreadsheet outlining all potential EPC credits, credits successfully achieved by the project as well as rationale for credits which could not be achieved. The Federal Buildings Initiative (FBI) program, introduced by Natural Resources Canada should be considered for application to renovated federal laboratories.

10.0 Application of the Canadian Environmental Assessment Act (CEAA)

The *Canadian Environmental Assessment Act, 2012* (CEAA 2012) and its regulations establish the legislative basis for the federal environmental assessment process. Projects must consider the potential for environmental impacts and application of the Canadian Environmental Assessment (CEA) Act.

As noted previously, given the age of the building, it is likely that building materials containing hazardous substances (e.g. lead, asbestos, etc.) are present. It is understood that information regarding previous surveys and testing for hazardous materials may be available ('Environmental Audit Screening Report, Canadian Environmental Assessment Act', prepared by PWGSC Environmental Services; and 'Environmental Audit Report' prepared by Oakhill Environmental) which date from 1995.

As part of the Laboratory Modernization Plan Project, consideration should be given at some point to allow for the commission of a Designated Substances Survey (DSS) to identify any hazardous substances present on-site, including their locations and concentrations which are mandatory under Ontario regulations. The scope of this survey would include site inspection to establish likely presence of designated substances, collection of samples and analysis and recommendations to address the presence of the designated substances by remediation and/or managing/monitoring. As the full impact of a CEA Act Assessment and Screening is unknown at this time, we propose to include this as part of the **RS 2.2.9 Risk Management** deliverables to identify this as a potential risk based on past experience and probability that it could have an impact on schedule or costs of the LMP.

11.0 Additional Requirements and Services

The design team has reviewed the available information (**Section 12.0**) and has toured the Administration and Laboratory Building at the CCIW. Based on the information available and the findings of the Investigation and Report to follow, we believe that we have sufficient information to carry out the Required Services through to Project Completion. We had previously identified a number of Mechanical and Electrical tests that may be considered as part of the on-going planning and design but do not believe that any of these are required in order to complete the required scope of work. As part of future Design Development and Contract Document Phases if the project proceeds, they may be required to verify information required for detailed cost estimating and construction but we do not believe the information is required at this time.

We have made some assumptions on which to base the Project Schedule and completion of the Required Services:

- Reasonable access to the A&L Building and Laboratories during the Investigation Phase. We understand that due to operational requirements, some lab areas may not be accessible. We can work around these parameters as required.
- That information from other reports or on-going activities at CCIW is given to the design team in a reasonable timeframe. This would have an impact on the Cost Plan developed as part of the Concept Design Phase.

12.0 Available Information

Public Works and Government Services Canada has made the following information available to the design team:

- Existing 'As-Built' Constructions Documents dated 1970 prepared for the original construction. (Approximately 200 drawings). It is understood that this information will have to be confirmed as part of the Investigation and Repot and subsequent phases.
- Hard Copy files of existing and renovated laboratories
- Digital Building Information Modeling files (Revit) prepared by Environment Canada. It is understood that this information will have to be confirmed as part of the I&R and subsequent phases
- CCIW Lab Report prepared by Environment Canada dated October 2011
- Asbestos Assessment Report prepared by Pinchin Environmental, dated July 12, 2013
- Fire Protection Compliance Monitoring Inspection Report prepared by Federal Fire Commissioner, dated March 2011
- Fire Protection Report prepared by Leber/Rubes Inc., dated November 15, 2013
- Building Condition Report prepared by PWGSC, dated September 2009
- Administration & Laboratory Central Exhaust System Study prepared by Filer Engineering Ltd, dated July 2013
- DRAFT Lab Standards Space Standard & Design Guidelines March 2014, Health Canada and the Public Health Agency of Canada (PHA)

The design team has reviewed the available information and believe that it is acceptable for the intended purpose. All information will be verified by the design team during the subsequent Investigation & Report as well as during the Concept Design Phases to follow.

13.0 Conclusion

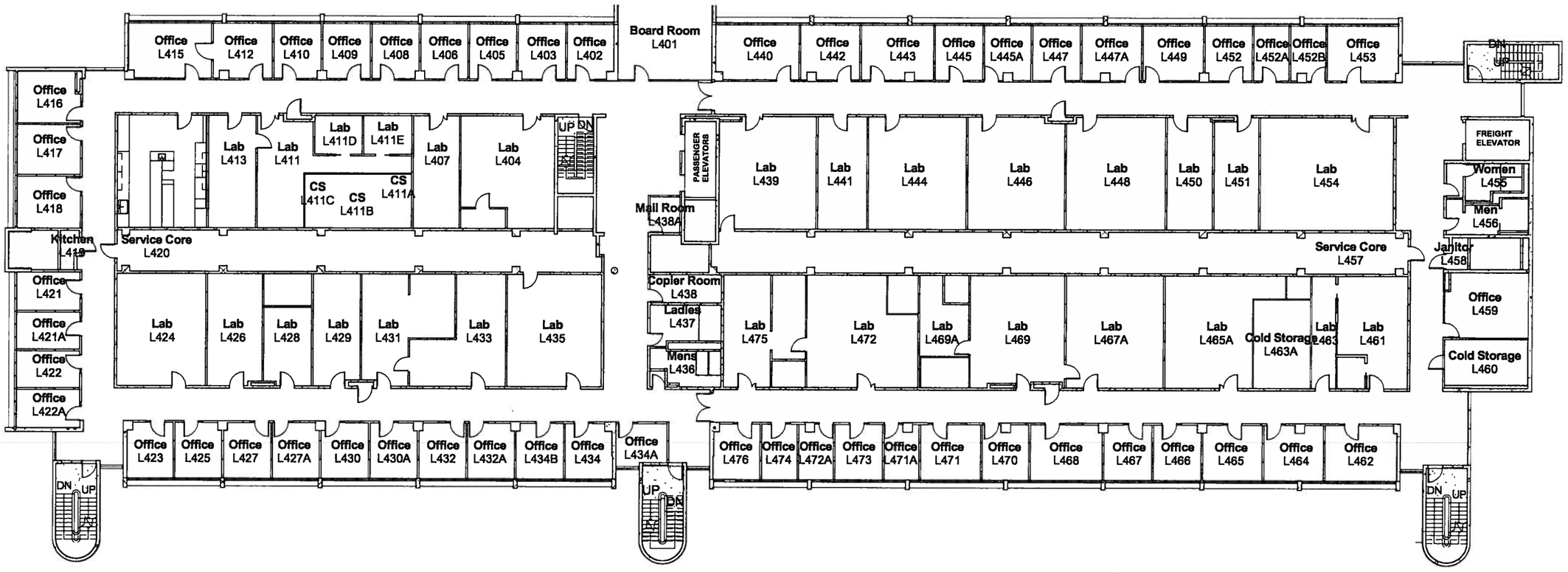
Based on the information contained in the RS 2.1.1 Analysis of Project Scope of Work we believe that we are able to proceed to **RS 2.2.1 Investigation and Report** Phase of the A&L LMP Project. During this phase the design team will further research and review existing conditions and documentation of the A&L Building and undertake a more detailed investigation of the existing building conditions, especially modifications that have been made over the past number of years. This investigation will allow the design team to gain a more comprehensive understanding of the facility to use during the Feasibility and Concept Design Phases.

The Report will record findings of our Investigation by drawings, photographs and narrative which will identify deficiencies and constraints with the existing facility. The Report will allow PWGSC and the design team to fully understand the base building conditions in order to undertake the proposed A&L Building Laboratory Modernization Plan for the CCIW.

We trust this report is acceptable and if there are any further questions, please do not hesitate to contact us.

Respectfully

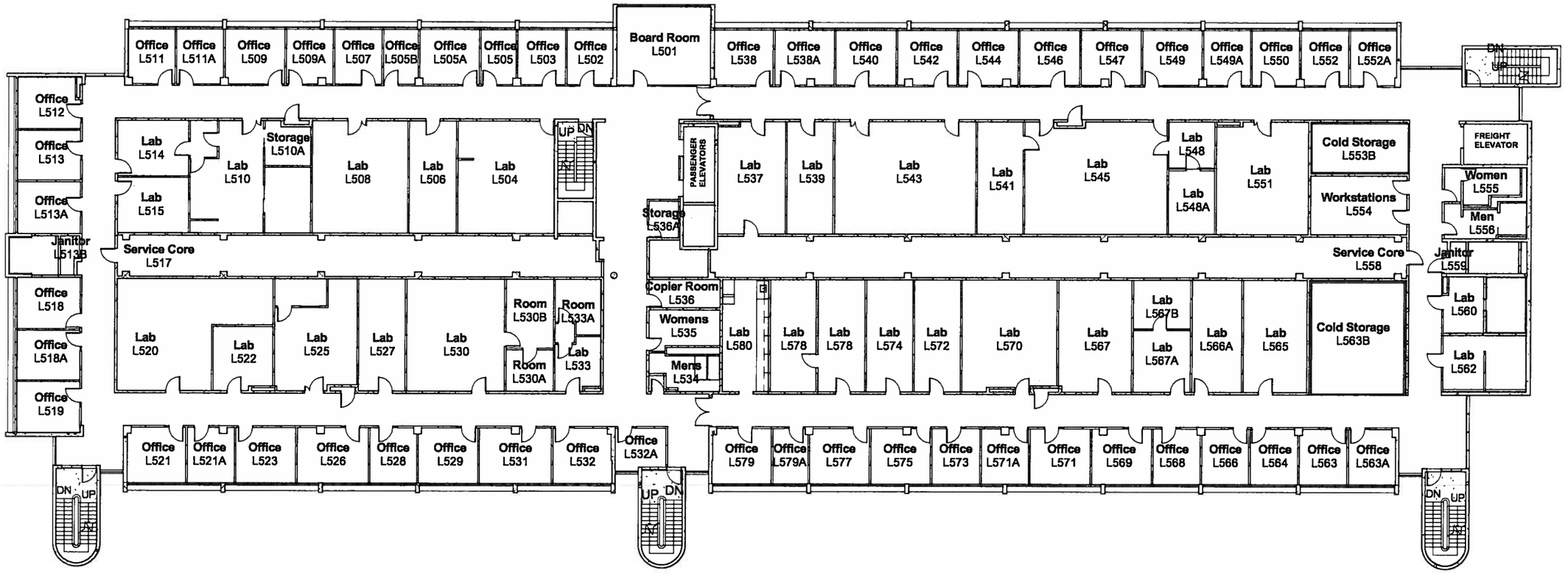
Robert Northcott, OAA, LEED AP
Senior Project Manager, DIALOG



CANADA CENTRE FOR INLAND WATERS
LE CENTRE CANADIEN DES EAUX INTÉRIEURES

4th Floor A&L

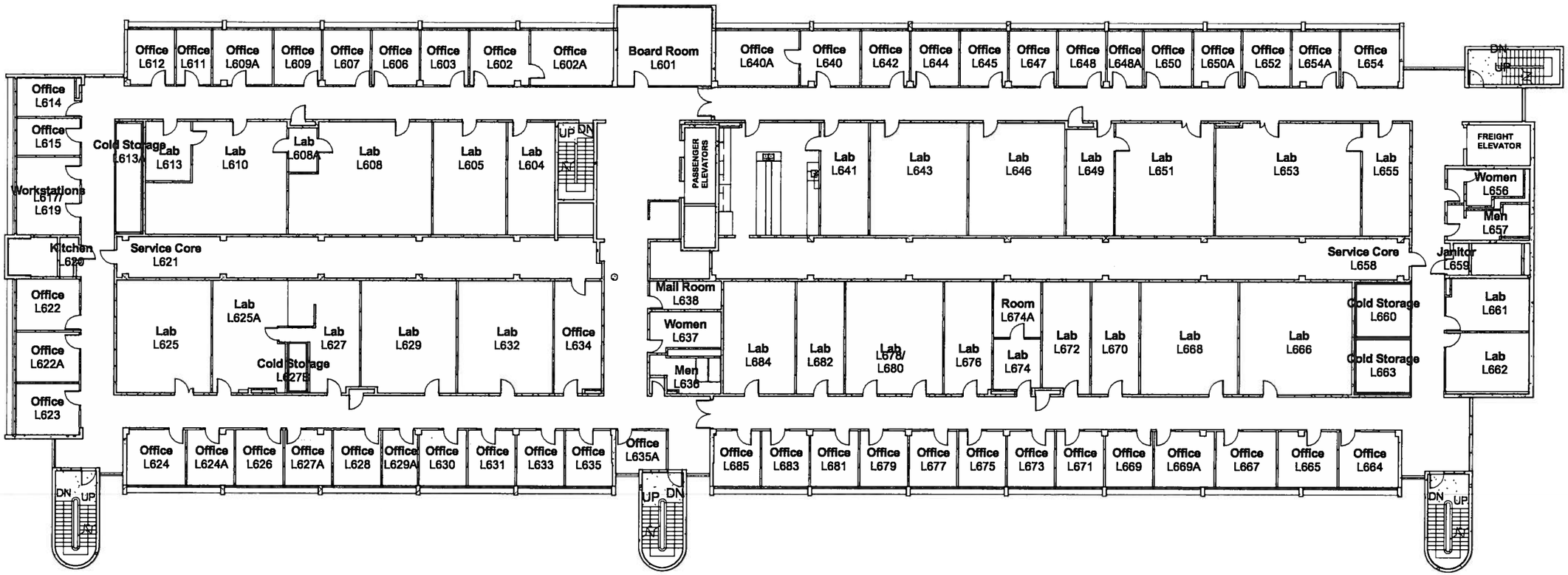
Scale 1 : 250



CANADA CENTRE FOR INLAND WATERS
LE CENTRE CANADIEN DES EAUX INTERIEURES

5th Floor A&L

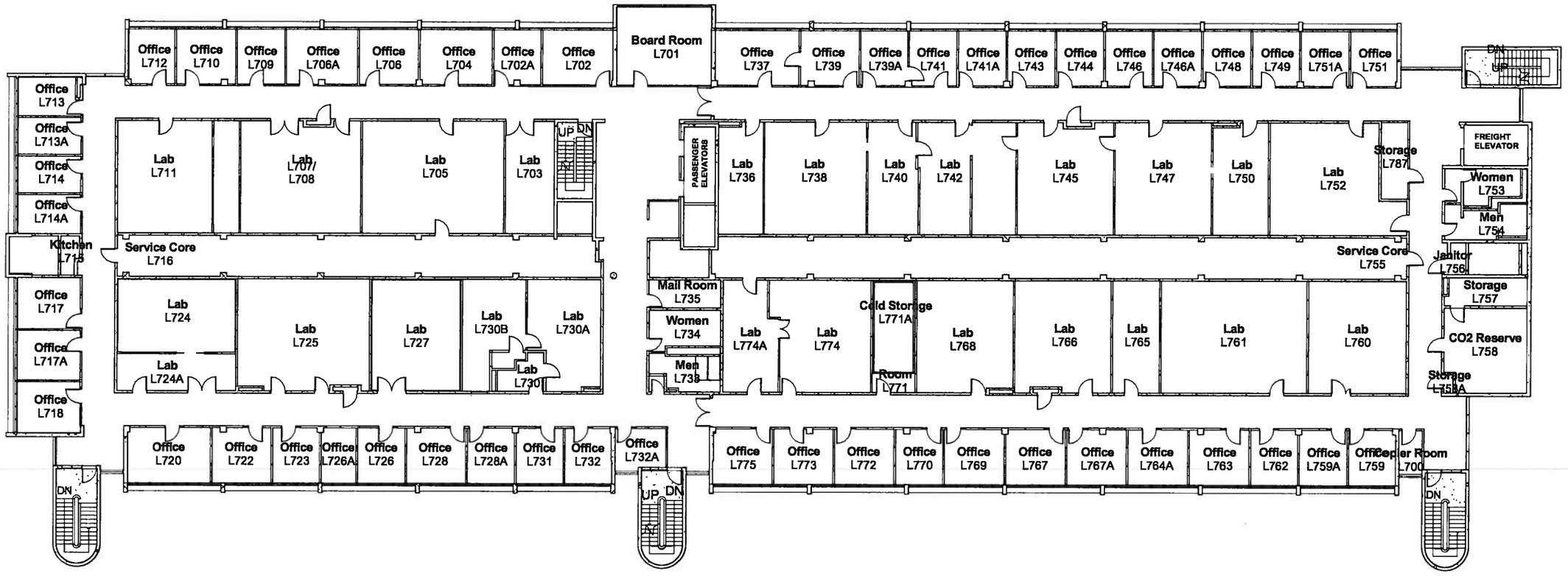
Scale 1 : 250



CANADA CENTRE FOR INLAND WATERS
LE CENTRE CANADIEN DES EAUX INTÉRIEURES

6th Floor A&L

Scale 1 : 250



CANADA CENTRE FOR INLAND WATERS
LE CENTRE CANADIEN DES EAUX INTÉRIEURES

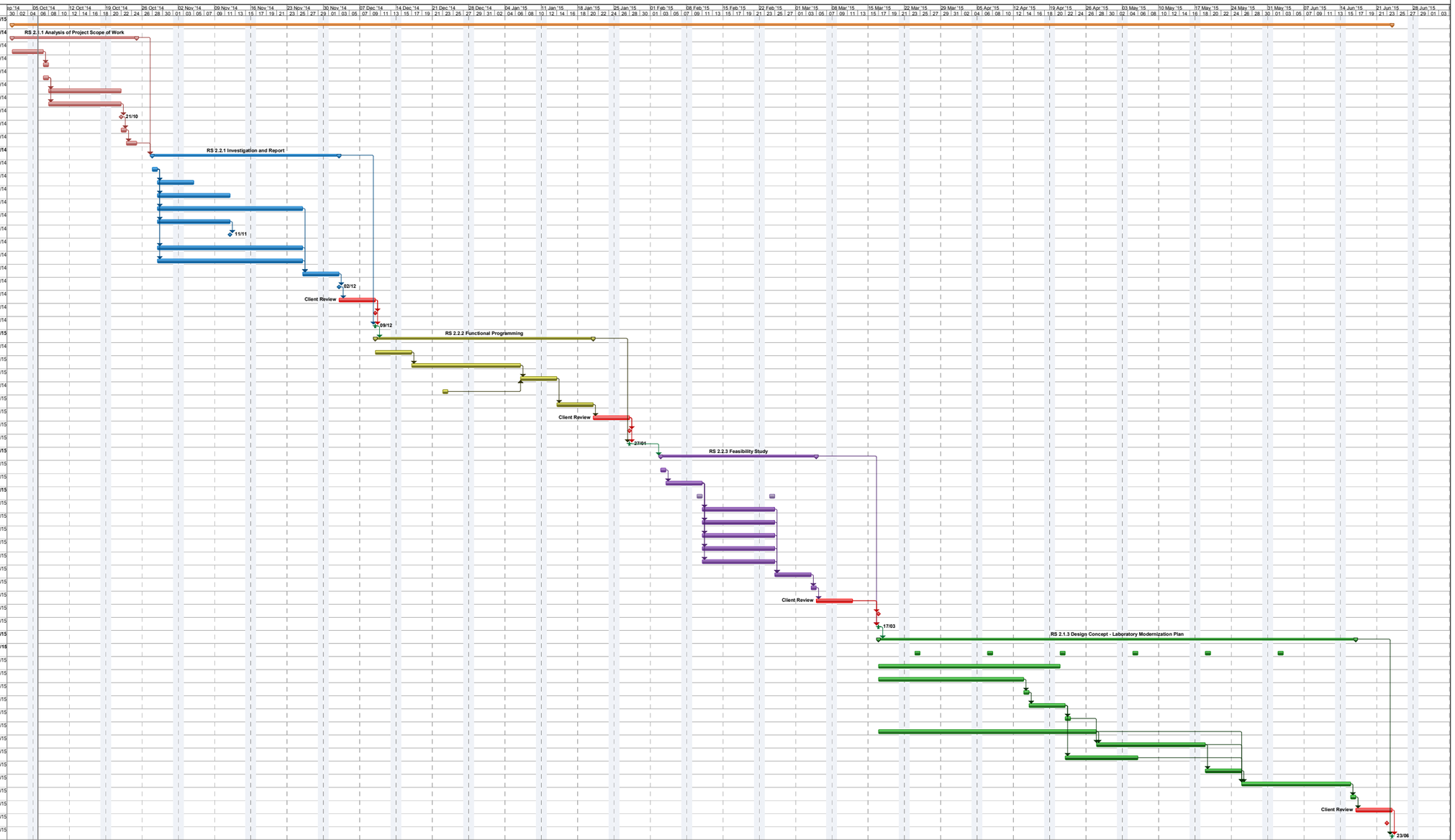
7th Floor A&L

Scale 1 : 250

R.072688.001 NWRI Canada Centre for Inland Waters Laboratory Modernization Plan for Administration and Laboratory Building - Burlington, Ontario

Project Schedule for Design 2014 10 06

ID	Task Name	Duration	Start	Finish
1	**NWRI CCW Laboratory Modernization Plan**	**190 days**	**Wed 01/10/14**	**Tue 23/06/15**
2	**RS 2.1.1 Analysis of Project Scope of Work**	**18 days**	**Wed 01/10/14**	**Fri 24/10/14**
3	Prepare Preliminary Project Schedule	4 days	Wed 01/10/14	Mon 06/10/14
4	Submit Project Schedule to PWGSC	1 day	Tue 07/10/14	Tue 07/10/14
5	Project Start Up Meeting with PWGSC/EC/Design Team	1 day	Tue 07/10/14	Tue 07/10/14
6	Review & Analysis of Project Requirements	10 days	Wed 08/10/14	Tue 21/10/14
7	Review Existing Documentation	10 days	Wed 08/10/14	Tue 21/10/14
8	Advise PWGSC of Additional Requirements	0 days	Tue 21/10/14	Tue 21/10/14
9	Submit Analysis of Project Requirements to PWGSC	1 day	Wed 22/10/14	Wed 22/10/14
10	Review Analysis of Project Scope of Work with PWGSC (if Required)	2 days	Thu 23/10/14	Fri 24/10/14
11	**RS 2.2.1 Investigation and Report**	**26 days**	**Tue 28/10/14**	**Tue 02/12/14**
12	Investigation and Report Start Up Meeting	1 day	Tue 28/10/14	Tue 28/10/14
13	Meet with CCW Facilities Staff to review existing conditions	5 days	Wed 29/10/14	Tue 04/11/14
14	Conduct Building Assessment, Review of A/S/M/E Systems	10 days	Wed 29/10/14	Tue 11/11/14
15	Prepare Existing Condition Drawings	20 days	Wed 29/10/14	Tue 25/11/14
16	Prepare Initial Risk Assessment Summary for PWGSC	10 days	Wed 29/10/14	Tue 11/11/14
17	Submit Initial Risk Assessment Report to PWGSC	0 days	Tue 11/11/14	Tue 11/11/14
18	Prepare Building Condition Summary Report	20 days	Wed 29/10/14	Tue 25/11/14
19	Prepare A/S/M/E & Laboratory Reports	20 days	Wed 29/10/14	Tue 25/11/14
20	Finalize all Reports for PWGSC	5 days	Wed 26/11/14	Tue 02/12/14
21	Submit Investigation Reports to PWGSC	0 days	Tue 02/12/14	Tue 02/12/14
22	PWGSC Reviews & Comments	5 days	Wed 03/12/14	Tue 09/12/14
23	Report Review Meeting with PWGSC/EC as Required	0 days	Tue 09/12/14	Tue 09/12/14
24	Approval to Proceed to RS 2.2.3 Functional Programming	0 days	Tue 09/12/14	Tue 09/12/14
25	**RS 2.2.2 Functional Programming**	**30 days**	**Wed 10/12/14**	**Tue 20/01/15**
26	Develop User Group Reporting Structure and Scope	5 days	Wed 10/12/14	Tue 16/12/14
27	User Group Meetings and Requirements (Surveys & Interviews)	15 days	Wed 17/12/14	Tue 06/01/15
28	Compile User Group Results into Program	5 days	Wed 07/01/15	Tue 13/01/15
29	Hold 'Goals & Objectives' Workshop with Stakeholders	1 day	Tue 23/12/14	Tue 23/12/14
30	Finalize Functional Program and Submit to PWGSC	5 days	Wed 14/01/15	Tue 20/01/15
31	PWGSC Reviews & Comments	5 days	Wed 21/01/15	Tue 27/01/15
32	Functional Program Review Meeting with PWGSC/EC if Required	0 days	Tue 27/01/15	Tue 27/01/15
33	Approval to Proceed to RS 2.2.3 Feasibility Study	0 days	Tue 27/01/15	Tue 27/01/15
34	**RS 2.2.3 Feasibility Study**	**22 days**	**Tue 03/02/15**	**Wed 04/03/15**
35	Feasibility Study Start Up Meeting with PWGSC/EC	1 day	Tue 03/02/15	Tue 03/02/15
36	Develop Feasibility Study Format and Scope of Work	5 days	Wed 04/02/15	Tue 10/02/15
37	**Feasibility Study Stakeholder Meetings**	**10 days**	**Tue 10/02/15**	**Mon 23/02/15**
40	Prepare Risk Management Report	10 days	Wed 11/02/15	Tue 24/02/15
41	Prepare Sustainability Report	10 days	Wed 11/02/15	Tue 24/02/15
42	Prepare Building Systems Capability Report	10 days	Wed 11/02/15	Tue 24/02/15
43	Prepare Final Feasibility Study	10 days	Wed 11/02/15	Tue 24/02/15
44	Prepare Elemental Cost Analysis	10 days	Wed 11/02/15	Tue 24/02/15
45	Finalize all Reports into Functional Program	5 days	Wed 25/02/15	Tue 03/03/15
46	Submit Feasibility Study & Other Reports to PWGSC	1 day	Wed 04/03/15	Wed 04/03/15
47	PWGSC Reviews & Comments	5 days	Thu 05/03/15	Wed 11/03/15
48	Feasibility Study Review Meeting with PWGSC/EC if Required	0 days	Tue 17/03/15	Tue 17/03/15
49	Approval to Proceed to RS 2.1.3 Design Concept	0 days	Tue 17/03/15	Tue 17/03/15
50	**RS 2.1.3 Design Concept - Laboratory Modernization Plan**	**66 days**	**Tue 17/03/15**	**Tue 16/06/15**
51	**Design Team Mtgs - PWGSC, EC & DLG**	**51 days**	**Tue 24/03/15**	**Tue 02/06/15**
58	Reviews w/ HRSDC/AHJ/PWGSC/EC Re: Life Safety, Codes	25 days	Tue 17/03/15	Mon 20/04/15
59	Prepare Preliminary Concept Design Documents	20 days	Tue 17/03/15	Mon 13/04/15
60	Submit Preliminary Concept Design to PWGSC for Review	1 day	Tue 14/04/15	Tue 14/04/15
61	PWGSC Reviews and Comments	5 days	Wed 15/04/15	Tue 21/04/15
62	Review Concept Design with PWGSC	1 day	Wed 22/04/15	Wed 22/04/15
63	Prepare Mech/Elec/Life Safety & Laboratory Concept Plans	30 days	Tue 17/03/15	Mon 27/04/15
64	Final Concept Design Report	15 days	Tue 28/04/15	Mon 18/05/15
65	Prepare Future Phasing Report	10 days	Wed 22/04/15	Tue 05/05/15
66	Prepare Cost Plan and Class C Cost Estimate	5 days	Tue 19/05/15	Mon 25/05/15
67	Finalize all Reports into Design Concept Program	15 days	Tue 26/05/15	Mon 15/06/15
68	Submit all Deliverables to PWGSC	1 day	Tue 16/06/15	Tue 16/06/15
69	PWGSC Reviews & Comments	5 days	Wed 17/06/15	Tue 23/06/15
70	Design Concept Review Meeting with PWGSC/EC if Required	0 days	Tue 23/06/15	Tue 23/06/15
71	Laboratory Modernization Concept Design Completion	0 days	Tue 23/06/15	Tue 23/06/15



Task · Milestone · Summary · Inactive Task · Inactive Milestone · Inactive Summary · Manual Task · Duration-only · Manual Summary Rollup · Manual Summary · Start-only · Finish-only