National Public Health Laboratory (NPHL) Block B

Refurbishment project and associated works

at the

National Public Health Reference Laboratory, Nairobi, Kenya.

User Requirement Specification

URS

Introduction

The National Public Health Laboratory Block B (NPHL) building is approximately 10 years old. It is a 5-storey building with basement, ground, first, second and third floors with a mixture of flat and pitched roofing over. It is located in a government compound and has an adjacent incinerator building constructed at the same time using the same materials and building style. The background and history section below describes the current situation against which this URS has been drafted.

Purpose

The purpose of this document is to list and describe the needs, requirements and expectations of the building users, to ensure that the planned refurbishment project provides for a fully functioning facility which meets contemporary guidance as published by the World Health Organisation, WHO.

This User Requirements Specification, URS, will inform the successful design and build contractor and BSL3 certifying consultant who will prepare detailed designs and plans and execute the refurbishment project such that all the user requirements are met. This includes a reasonable expectation of minimum useful service life of the building of 25 years, assuming a well-managed planned preventative maintenance regime is put in place. To facilitate this a complete set of Operation and Maintenance manuals are required to be approved by the certification consultant, including all commissioning data and as built drawing sets a minimum of 6 weeks prior to handover. During this six-week period, post completion, the building will be expected to operate faultlessly and without intervention to demonstrate that all works are complete, and the building operates effectively as intended. The six-week period will restart if deemed necessary due to significant issues developing. Certification of the BSL3 suites will be granted at the end of the six-week period.

Background and history *(Deterioration Report on BSL III @NPHL BLOCK B)*

The National Public Health Laboratory (NPHL) Block-B facility was a gift from The US Government through PEPFAR to the People of the Republic of Kenya. The building was constructed through procurement and technical oversight of the CDC and handed over on 14th August 2015 to the Ministry of Health. The facility houses two (2) BSL-3 Laboratories (National TB Reference Laboratory and National HIV Reference Laboratory) among other vital utilities. The BSL-3 is a high-security containment facility that currently handles Tuberculosis surveillance (Drug susceptible, Multidrug Resistance, Pre-XDR and XDR TB) and Virological organisms.

Three years post-occupation of the facility, the epoxy floor was chipping, pronounced cracks on the walls became visible, and leakages in the piping drainage system on all floors greatly affected the building's functionality. In addition, the scope of work for the facility did not factor in the expanding need for equipment space and electrical cabling to meet the increasing number of equipment in the laboratories. The electrical component did not have the capacity for high throughput testing equipment. This has resulted in an overload of circuit lines with a history of power tripping and outages caused by lack of upgraded electrical infrastructure to support clean energy utilization in an efficient system. The master power technical report detailed part of the failures in the building and the BSL-3 Laboratories that integrated wall-to-wall autoclaves that required a 3-phase power to operate. In the initial phase when autoclaves were switched on, power went off in all other Laboratories within the building. The Heating, Ventilation and Air- Conditioning (HVAC) system was installed by sub-contractors who disagreed with the contracting firm on their contractual and financial terms. This led to the software and control panel being disabled. This happened after AFMS certification had been completed and the BSL-3 had been declared fit and safe to carry out its intended operations. Upon occupation of the facility, the TB Personnel notified the resident Biomedical engineers about system failure who acted by booting the HVAC system manually through a by-pass to support much-needed MDR and Pre-XDR TB operations.

An appointed committee visited the laboratory and documented the then status. Observations are as outlined below.

1. Builders works
a. Chipped epoxy floors posing risk to staff and equipment
b. Cracked and peeling walls
c. Popping up of floor tiles
d. Non-standardized doors with spaces interfering with Negative pressure
e. Sample reception window broken
f. Stagnant water on the roof with leakages on the roof slab
g. Damaged ceiling boards exposing the leaking roof

2. Mechanical works
a. Copper pipes vandalized
b. High temperatures within the rooms due to non-functional HVAC system
c. HVAC & BMS System is nonfunctional
d. Lack of extractor fans at staining benches where there are some fumes

3. Electrical works
a. Biometric locks not working
b. Three-phase power not covering the entire BSL-3; some equipment are not connected
c. Non-functional CCTV cameras to monitor safety of HVAC and BMS system as well as intruders into the building

4. Waste Management
a. Piling of waste inside the Laboratory as a result of incinerator breakdown In addition, it was noted that due to the failure of the Building Management System (BMS) and the entire Heating and Ventilation Air Conditioner (HVAC) system, the staff working there could be exposed to infectious virological and MDR TB strains. The committee recommended that the BMS and HVAC systems needed to be restored to the expected World Health Organization containment standards of BSL3.

Compiled by Nelly Mukiri-Manager National TB Reference Lab

User Requirements Specification URS

Second Floor: National TB Reference Laboratory (NTRL)

The following user requirements are tailored to the NTRL BSL3 suite including anteroom.

BSL3 Laboratory Suite: NTRL (including anteroom)

Floors

Identify the root cause of the catastrophic failure and dilapidation of the original epoxy flooring systems. Design a solution to remove and replace the epoxy flooring system, to include the remediation or replacement of all substrates as required to facilitate a permanent solution which eliminates all risk of future delamination and failure of new epoxy flooring systems.

Fully remediate by total removal and replacement of all original dilapidated epoxy flooring systems. Remediation shall include the removal and replacement of all failed and sub-standard substrates. Removal and replacement specifications are to be approved by the certification consultant and client prior to execution of the works. The complete, new epoxy flooring system should be designed for a minimum service life of 25 years with appropriate care. A warranty for a minimum of 5 years should be provided for all materials and workmanship.

Important notes: The proposed solution must consider the interface with laboratory benching framework which by inspection appears to have been installed prior to the original epoxy flooring application. Treatment of all sub surfaces including loose substrates and any cracking must be remediated to an agreed standard and specification prior to application of the new epoxy flooring system. All works must be completed fully in accordance with manufacturers instructions and include the use of all required cleaners, primers and other treatments. Ensure strict drying and curing times are observed between each coat or system application in a controlled environment fully in accordance with the system manufacturers instructions. Ensure proper treatment of the interface between epoxy floor finish and walls and ensure a suitable coved finish is provided at all floor-to-wall junctions.

Option: propose an alternative and equivalent hard wearing flooring systems suitable for a BSL3 laboratory environment and capable of a minimum working life of 25 years.

Walls

Identify the root cause of all cracks delaminations and failures observed in the BSL3 laboratory suite walls. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate the existing cracks and prevent or control any future movement. Remediate the existing paint finish including designed accommodation for any future predicted movements to reasonably prevent or accommodate future predictable cracking.

Suggested options for crack repair, the choice of which may depend on establishment of a root cause.

Option A: Open-up and fill – the crack should be opened-up along its entire length to a suitable depth including substrates and sub-structure as needed. The width and depth of the opening should be calculated in accordance with recommended guidance on crack repairs and/or good practice movement joint design. Using an approved sealant manufacturers products and recommendations and using all recommended cleaners, sealers and primers and with a suitably selected backing rod installed apply a mastic sealant to a designed depth and width to ensure a complete and permanent flexible seal. The sealant should be compatible with the existing BSL3 wall paint system and after recommended curing times be overpainted to match the existing laboratory paint finish. Allow for any

primer over the sealant to allow good paint adhesion. The crack should be monitored and inspected annually for signs of change.

Option B: Reinforced plaster repair. This requires a larger area of plaster to be removed. Any cracks in the substructure are repaired as option A. A new reinforced plaster layer is then reinstated over a polythene sheet separating the cracked sub-structure from the plaster finish. Any further movement beneath the new plaster finish should not result in further cracking.

Alternative remediation options for BSL-3 walls: Provision for low-level extract panels with an integral air return system within the panel itself. Work on the ceiling that should be custom-designed from the factory to support ducting, lighting, and air leakage. Doors should be seamless, durable, and hygienic, with vision window panels featuring rubber sealing and a passbox to allow integrated biological control during material transfer between controlled rooms.

Important notes: The proposed solution must consider the interface with laboratory benching framework which by inspection appears to have been installed prior to the original wall paint application. The colour of the bench tops to match the walling - off white or white colour.

Ceilings

Identify the root cause of all cracks, delamination and failures observed in the BSL3 laboratory suite ceilings. Identify the underlying failure mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate the existing cracks and prevent or control any future movement. Remediate the existing paint finish including designed accommodation for any future predicted movements to reasonably prevent or accommodate future predictable cracking. Ensure compatibility with all surfaces to ensure delamination including the necessary cleaning and priming of metallic services and installations including the ventilation systems. Ensure the ceiling finish is continued in a monolithic coating behind all light fittings and up to and including existing exposed ventilation ductwork.

For crack repair, based upon root cause, follow similar techniques for wall painting and crack repair. For junctions with building services elements design a solution to prevent future delamination and peeling of the finished paint system.

Painting

To have the paint changed to off-white. Thoroughly clean all surfaces to remove dust, dirt, oil, grease, and any other contaminants before painting. Sand or smooth any rough areas as needed. Fill any cracks or holes with an appropriate filler, ensuring the surface is smooth and uniform. Prime surfaces as required to ensure proper adhesion of the paint. Apply one coat of the primer using a brush, roller, or spray as required, ensuring uniform coverage. Allow the primer to dry completely before applying the first coat of finish paint. Apply two coats of finish paint, ensuring proper drying time between coats (as per manufacturer's recommendations).Each coat must be evenly applied to provide a uniform finish, free from runs, streaks, or defects. All work must be inspected for coverage consistency, uniformity, and finish quality ensuring that all surfaces are free from drips, smears, and visible brush strokes after application, and that paint colour and sheen meet project specifications.

Doors and entry points

The NTRL BSL3 suite has 3 doors. There are two no. anteroom doors (one outer and one inner), and one set of double doors designed for the delivery and removal of large equipment.

Anteroom doors
The existing anteroom doors are made of metallic shutter and frames construction all painted white. The frame is on 3 sides with a top light window over. There is a large vision panel provided along with handles, bump strips and an access control system (not functioning). The doors are also complete with manual key locks.

The existing doors require either replacement or refurbishment and both options are to be designed and priced (cost). The doors should be reasonably low leakage but need not be airtight. Taping at frames/edges would normally be recommended prior to gaseous decontamination.

Equipment doors
The existing equipment door made of timber double leaf centre opening with a three-sided timber frame and top lights over with a centre spar. The door leaf is complete with a large viewing window to allow observation of the BSL3 suite. The door is fitted with a manual lock but not connected to the non-functioning access control system. The door is for occasional use only and when not used remain locked. Consideration should be given to emergency egress as may be required. The door is normally used only to admit or remove large items of furniture and equipment typically when the laboratory has been decontaminated during a planned shutdown.

The existing door requires either replacement or refurbishment and both options are to be designed and priced (costed). The door should be either reasonably low leakage or airtight. Inspect and repair as required or replace. If the existing door is retained and repaired, it can be painted to match the existing anteroom doors.

Proposed pass-through window/ pass through box
To facilitate the admission of samples etc. a pass box is proposed to be installed in the position indicated on the architects' drawings in the larger wall adjacent to the equipment access door.

The pass box should have a minimum clear internal dimension of 500mm x 500mm x 500mm (WxHxD) and be complete with two fully glazed doors and seals on each side. The doors should be mechanically or electromechanically interlocked such that only one door can ever be opened at once. This system should be failsafe on loss of power. Integrate a small HEPA filtered inlet and outlet such that air may flow into the BSL3 suite under the normal negative pressure. Ensure operator instructions include for a required dwell time between opening of the outer 'clean' door and the inner 'dirty' door. The pass box system should be used only to allow delivery of samples/consumables into the laboratory. No contaminated samples or materials should exit the BSL3 suite via this new pass box. Separate procedures and SOPs will be required if this facility is ever needed.

Pass box construction, as for all other materials to be utilised inside the BSL3 (and BSL2 suites) should be robust and hardwearing, smooth, easy to clean, impervious to the chemicals used for cleaning and decontamination including fumigation if required. They need to be sealable or capable of being sealed for gaseous decontamination.

Windows

The NTRL BSL3 suite has 3 external window openings on the west external façade of the building. Each opening comprises 6 fixed windowpanes in aluminium frames. The seals between the frames and glazing panes have failed and require complete replacement. Remove and set aside all glazing, clean and repair frames and re-fix glazing panels using a suitable robust seal. On completion and when the laboratory is operating under negative pressure, test all seals using a smoke pencil or bubble test to confirm adequate air tightness. The windows should be lightly tinted to avoid the direct light in the afternoon.

Benching and furniture

Removal all fixed and portable laboratory benching and all supporting frameworks (except existing dwarf walls) to facilitate a monolithic application of the new floor and wall finishes. Modify the benching in accordance with the Architects' drawings and specifications and reinstate. Modify if required at floor/wall coving or propose alternate equivalent solution.

Where indicated on the Architects' plans shorten and make good existing dwarf walls.

Modify engineering services to suit the new arrangement of benches and equipment.

Laboratory Bench tops:

All bench tops should be made of granite (Off white) matching the walls; Economically suitable as per the laboratory standards. Must be a seamless one-piece design to prevent contamination. Penetrations for electrical, plumbing, and other considerations must be completely and permanently sealed. Must have a backsplash against the wall. Walls should be painted with washable, hard non-porous paints. The final paint finish colour will be off-white. Thoroughly clean all surfaces to remove dust, dirt, oil, grease, and any other contaminants before painting. Sand or smooth any rough areas as needed. Fill any cracks or holes with an appropriate filler, ensuring the surface is smooth and uniform. Prime surfaces as required to ensure proper adhesion of the paint. Apply one coat of the primer using a brush, roller, or spray as required, ensuring uniform coverage. Allow the primer to dry completely before applying the first coat of finish paint. Apply two coats of finish paint, ensuring proper drying time between coats (as per manufacturer's recommendations).Each coat must be evenly applied to provide a uniform finish, free from runs, streaks, or defects. All work must be inspected for coverage consistency, uniformity, and finish quality ensuring that all surfaces are free from drips, smears, and visible brush strokes after application, and that paint colour and sheen meet project specifications.

Anteroom lockers, cupboards and stepover bench provision (new)

As indicated on the architectural layouts, provide storage lockers or cupboards on each side of a new stepover bench for the storage of clean and dirty laboratory garments and PPE.

The lockers must ensure proper segregation of clean and dirty PPE and laboratory garments to avoid cross-contamination; the exterior material should be stainless steel (grade 316) with a smooth, brushed finish to facilitate cleaning and sterilization. All surfaces must be corrosion-resistant, durable, and easy to disinfect. Interior Material should be Stainless steel (grade 304 or 316) or powder-coated steel, also resistant to common laboratory disinfectants. There should be no internal seams, cracks, or joints that can trap dirt or contaminants. Surfaces should be smooth, non-porous, and easy to wipe down and sterilize. The lockers must meet relevant safety and containment standards, including any local or international regulations concerning laboratory biosafety and biosecurity.

Lockers for Clean Garments (Clean Side):

The dimensions should be **1800mm height x 1600mm width x 500mm depth**. The doors should be self-closing with a secure sealing mechanism to prevent contamination. Install clear windows to easily identify contents without opening the locker. The Shelving should be adjustable shelves made of stainless steel with smooth, rounded edges to avoid debris accumulation. Shelves should support the weight of lab garments and PPE, with load-bearing capacity of around 50-100kg.It should have Secure, tamper-proof locks, preferably key-based, electronic, or combination locks, to restrict access to authorized personnel. The locker should be clearly marked "CLEAN" for easy identification.

Lockers for Storage at the ante room :

Should be of similar dimensions to clean lockers but designed for more robust storage with larger compartments to store used garments. The lockers should be airtight, with seals to prevent escape of

any biological agents, ensuring that the contaminated garments do not affect the rest of the laboratory environment. The doors should be self-closing doors with tight seals to ensure that contaminants do not escape. The doors may be fitted with a “dirty” or “used” label to differentiate from the clean section and be designed to minimize contact such as foot-operated or touch less).The Shelves or hanging racks for storing used garments should be done in a way that minimizes contamination risk. These could include a hanging area for lab coats and hooks for gloves, shoes, and goggles. The locking mechanism should be secure to limit access to authorized personnel only. The locker should be **c**learly marked “DIRTY” for easy identification.

The step-over bench must adhere to relevant biosafety and biosecurity standards and should be made of Stainless steel (Grade 304 or 316) for maximum durability, ease of cleaning, and resistance to corrosion. Frame should have smooth, seamless joints and be welded to prevent areas where contaminants could accumulate. The surface should have a brushed or polished finish to minimize dirt accumulation and allow for easy disinfection. All surfaces must be smooth and free from crevices or cracks.

The bench’s dimension should be **1600mm width x 600mm depth x 400mm height**, and have a two-step or multi-step design, ensuring easy transition between the clean and dirty side of the ante room. The steps should be wide enough to provide stability but not so large as to allow unnecessary contamination between the areas. Install heavy-duty rubber or non-slip material on the steps to prevent slipping while ensuring safety during use. The rubber or plastic materials used must be resistant to common laboratory disinfectants.

There should be a clear physical partition or barrier (e.g., solid or mesh) separating the clean side and the dirty side to prevent cross-contamination. The bench must be sturdy enough to support the weight of laboratory personnel (atleast 150kg) without compromising its structural integrity. The top and steps should have a non-slip surface (e.g., rubber matting or textured steel) to ensure personnel do not slip while using the bench.

The bench must be compatible with standard laboratory disinfectants such as 70% ethanol, bleach solutions, and hydrogen peroxide and be designed to withstand heavy use and regular cleaning and disinfection without deteriorating over time. It should be securely anchored to prevent movement during use, ensuring stability and safety when stepping over it and should have no any sharp edges or protruding components that could cause injury during use or while cleaning.

The bench should be marked with clear signage of visual markers (such as colour coding or symbols) indicating which side is for "Clean" and which side is for "Dirty" to reduce the risk of cross-contamination.

Mark the floor with tape and letters to clearly indicate the clean and dirty side to accord with laboratory SOPs.

Anteroom

Procedure and refurbishment of anteroom floor, wall, ceiling doors and engineering services is as the other described sections of BSL-3 renovations.

Waste Management

Autoclave – pass through BSL3 Autoclave – loading side.
Refurbish the existing Tuttnauer double door pass through autoclave.
Carry out an inspection and determine the performance of the existing a pass-through autoclave in the BSL3. Identify the problems including extraction hood and fan-duct system, reliable water supply, data logger that alerts the focal person connection, and design a solution to repair and provide a detailed guidance on future maintenance

Engineering services

Mechanical

The existing Heating Ventilation and Air Conditioning (HVAC) systems and controls are non-functioning. These systems should provide the NTRL BSL3 laboratory ventilation airflow and pressure controls which are required to support the laboratory secondary containment engineering control systems. These systems require a complete overhaul with some system components needing to be replaced. Previous investigations have suggested a major overhaul is required including replacement of the supply air handling units and extract fans and major overhaul of the HEPA filter housings and supply and extract ductwork systems. The existing extract ductwork system serving the second floor NTRL BSL3 suite can be inspected in the plant room directly above on the third floor. It is believed only major overhaul of this system is needed (cleaning, leakage pressure testing and rebalancing). However, control system components such as balancing and shut off valves and all controlling sensors may require replacement. It has been suggested in previous reports that the supply air handling unit be replaced completely, supplemented by a new chiller and that the extract fans would also benefit from replacement by direct drive systems (existing fans are belt driven).

The existing BMS control system is not functioning and for a period the system was operated in a manual mode. A wholesale replacement of the HVAC building management/building automation control system has previously been recommended.

Prior to the design of any new systems careful checks of the original design and commissioning documentation should be undertaken to ensure that any new fans are selected with adequate capacity for the full operation of the system including spare capacity for filter loading on both the supply and the extract ventilation systems

Additional supply HEPA terminal filters

A proposal to add terminal supply HEPA filters should be included in the design and cost proposals for these refurbishment works, and due note of this additional system resistance should be considered when designing, selecting and specifying all system fans, motors and drives.

Proposals for the addition of new terminal HEPA filters should include the provision for condition monitoring and for the testing of the effectiveness of the installed filters and filter seals. The filters should be easy to replace and from a manufactured stock easily available in Kenya.

NTRL BSL3 Laboratory HVAC recirculation system

Add a recirculation duct after the exhaust HEPA filter housing to allow air to be recirculated back into the NTRL BSL3 laboratory suite under power and control and with a fully analogue controllable functionality to operate between 100% recirculation and 100% exhaust to atmosphere. During normal operation the system will operate based on minimum fresh air requirement either pre-set or scheduled based on extract air CO2 concentration. The system shall be fitted with an emergency boost button(s) strategically located inside the laboratory which will enable 100% exhaust for use in the event of a significant laboratory spill. The system shall also facilitate user operated control via the BMS/ building automation system to facilitate gaseous decontamination including 100% recirculation during decontamination moving proportionally to 100% exhaust for purging. Timers should be included for this operation capable of user adjustment to suit the fumigation method, dilution and holding and purge times.

Electrical

The existing electrical system has been reported to be under capacity (separate electrical report refers). The successful contractor shall design a supplementary electrical system to bolster the existing system to meet the anticipated demands which include all new equipment. Provide additional

electrical outlets as required to serve the laboratory at full capacity and include where indicated specialist supplies such as maintained supplies and 3PH connections.

The detail of the electrical installation is expected to be worked through with users during the detailed design phase. Refer also to the electrical specifications' documents and drawings.

For additional central electrical supply system requirements refer to the Electrical section under Building Engineering Services below.

Lighting - the lighting in the BSL3 suite should be refurbished with all defective components made good. It should be removed for painting and refixed afterwards. All fixings are to be airtight.

Plumbing and drainage
The existing NTRL BSL3 laboratory suite is equipped with a proprietary Vulcathene drainage system including laboratory sinks, dilution traps and Vulcathene mechanical piping systems.

The system requires a general overhaul and cleaning with all replacement parts provided to be bona-fide Vulcathene components. Ensure all cleaning is completed fully in accordance with manufacturers' instructions and guidelines. Vulcathene sinks, Vulcathene anti-syphon bottle traps and Vulcathene dilution recovery traps (glass base) should only be replaced like for like if beyond reasonable repair. Where anti-syphon bottle traps require replacement, substitute the opaque base (bottle) with a glass base (bottle), this will provide better indication of any trapped foreign object such as discarded pipette tips etc.

Controls and instrumentation
The NTRL BSL3 suite HVAC control system is not functional, a condition believed to be a result of industrial sabotage. It is understood the system requires complete replacement. However, an investigation needs to be undertaken to determine if some or all the existing wiring installation can be reused before a decision is taken to replace it completely.

BMS control panels are in the technical plant room above the BSL3 laboratory on the third floor. Instrumentation including room condition measurement and indicating devices are located outside the laboratory entrance at high level. As part of any replacement it will be required to provide audible and visual indication and alarms to alert users to the safe or unsafe condition of the laboratory suite prior to entry and during normal occupancy and use.

Prior to entry the users need to be made aware of the condition of the ventilation system, so operation OK or NOT OK, visualisation of the room conditions including pressure, temperature and humidity (if controlled). With a clear and obvious green light to enter.

Inside the laboratory where users will be working and concentrating it will be necessary for suitable audible and visual alarms indicating unsafe conditions or system failure. This will allow for safe conclusion and shutdown of work prior to action according to the laboratory SOPs. It is anticipated BSCs will be provided with suitable uninterruptible power supplies.

Access controls and security
Provide a completely new access control system for the NTRL BSL3 laboratory suite which should be integrated into the building wide access control system allowing tiered security and access control from the external entry points into the BSL3 suites via the BSL2 suites.

Fire detection and alarm systems
Review the existing fire detection and alarm system. If it is to be retained, ensure it is protected throughout all construction works and that it is fully tested and certified upon completion of all works.

If it is deemed not serviceable, replace as needed and expand the existing fire detection and alarm system to meet MOPW standards. The work should meet the details specified in the relevant electrical document

Intruder detection and alarm systems
Install an intruder detection and alarm system with the following capabilities: Self-monitoring, with Motion detectors (PIR), door/window sensors, compatible with other smart devices like lights, thermostats, and cameras and have remote management capability.

Carry out Biosecurity Risk and threat assessment and a general security risk assessment to determine what level of biosecurity is required which may include a new or uprated intruder detection and alarm system.

Miscellaneous

Uninterruptable power supplies: UPS
Uninterruptable power supplies for Biosafety Cabinets (BSCs). Ensure each BSC is powered by an adequate UPS system to ensure safe operation and shutdown under control in the event of an emergency.

BSL2 Laboratory Suite: NTRL

Floors

The NTRL BSL2 laboratory suite has the same contiguous epoxy flooring system that serves the NTRL BSL3 laboratory suite and laboratory support areas (refer to architects plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite ‘floors’ in the section above. This includes coving at floor/wall junctions. Retain the existing emergency shower and install eye wash stations that are attached to the sink.

Walls

The same general approach to crack repairs will be required as well as the treatment of the interface between floor and wall coving details. The wall is carried above the suspended ceiling system and so some cracking above the ceiling may be present and will require crack repair and sealing as generally specified for the walls in the NTRL BSL3 suite.

The NTRL BSL2 laboratory suite walls have a different paint finish to the NTRL BSL3 laboratory suite. Painting should be all off-white in colour, with mould protector, fumigatable, and can be easily cleaned. Thoroughly clean all surfaces to remove dust, dirt, oil, grease, and any other contaminants before painting. Sand or smooth any rough areas as needed. Fill any cracks or holes with an appropriate filler, ensuring the surface is smooth and uniform. Prime surfaces as required to ensure proper adhesion of the paint. Apply one coat of the primer using a brush, roller, or spray as required, ensuring uniform coverage. Allow the primer to dry completely before applying the first coat of finish paint. Apply two coats of finish paint, ensuring proper drying time between coats (as per manufacturer's recommendations).Each coat must be evenly applied to provide a uniform finish, free from runs, streaks, or defects. All work must be inspected for coverage consistency, uniformity, and finish quality ensuring that all surfaces are free from drips, smears, and visible brush strokes after application, and that paint colour and sheen meet project specifications.

Ceilings

The NTRL BSL2 laboratory suite and most supporting areas is fitted with an ‘acoustic ceiling’ (contains small sound absorbent fissures in its visible surface). It is generally in good order, but all damaged and stained tiles are to be replaced. The tile replacement should take place only after the root cause of the damage and/or staining has been identified and remediated. In addition to replacing damages, stained and discoloured tiles the supporting frame should be remediated and made good as needed.

Works to refurbish the light fittings, all ceiling mounted electrical accessories, including fire detection and alarm systems, and any refurbishment of the comfort cooling ceiling cassette units will be required to be completed and will be specified in more detail in the relevant section or specification.

Doors and entry points

The main entrance door to the TB lab to be replaced with a stainless steel door with access control, opening to the outside and a window pane.

The first door on the right after entering the lab, to be replaced with a push bar pushing door opening to the outside of the lab and a window pane, should have access control.

Windows

Inspect for any locking problems and failure of seals between the frames and glazing panes. Repair any locking problems and completely replace the seals. Remove and set aside all glazing, clean and repair frames and re-fix glazing panels using a suitable robust seal. The windows should be lightly tinted to avoid the direct light in the afternoon.

Reception window to be replaced with a pass box. Repair and extend the reception window with a passbox. Extend the epoxy finish bench tops on both sides of the passbox to accommodate an area where samples can be placed.

Benching and furniture

All working tops to be replaced with Epoxy finish bench tops materials that are smooth and easy to clean. Firm enough to hold auxiliary equipment like bench centrifuges.

On the microscopy bench where staining takes place ensure provision of a bench top that cannot be stained.

Waste Management:

Provision for 20 litres foot pedal waste Bin at each side of a BSC (15), in addition, waste holding racks used inside the BSC (at least two in each BSC)

Autoclaves:

Two Stand-alone autoclaves, one at the BSL 3 and the Other at BSL 2 to decontaminate the waste before it leaves the laboratory

Service and repair the existing pass-through autoclave and ensure that it is connected to a reliable source of water

Equipment:

Room temperature thermometers (20 pcs)

Data loggers (40 pcs)

Electrical dispenser for sanitizer (20 pcs)

Engineering services:

Service/repair existing equipment (LPA, MGIT, Pass through autoclave, Lift etc) to ensure resumption of testing after refurbishment.

Bring back the old, functional equipment, install and ensure it is working properly after refurbishment.

Miscellaneous

Painting should be all off-white in color, with mould protector, fumigatable, and can be easily cleaned

Provide hooks for hanging coats after use used

Install stainless steel cabinets to store gloves labelled in all sizes (small, medium and Large): (30*15cm each shelf, 3 shelves total)

The washroom area should be fitted with staff changing cabinets which are lockable, a shoe rack where they place crocks for changing as they enter the laboratory.

Installing 3ft metal between the corridor, lift and the wall starting from the lab main door to the exit door which acts as a scratch barrier for the wall.

Incubator Room:

Floor

Incubator room has an epoxy flooring system in a dilapidated state (refer to architect's plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite 'floors' in the section above

Walls

Inspect for any existing cracks/water ingress and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Suggested options for crack repair, are as per the procedures in BSL2 crack repair work.

Ceiling

The area is fitted with an 'acoustic ceiling' which is generally in good order. Inspect for any damaged and stained tiles and replace. The tile replacement should take place only after the root cause of the damage and/or staining has been identified and remediated. In addition inspect for any damaged supporting frame remediate and make good as needed.

Refurbishment of the light fittings, fire detection and alarm systems, comfort cooling ceiling cassette is specified in detail in the relevant section or specification.

Doors

The main door is made of timber single leaf opening with a three-sided timber frame and top lights over. The door leaf is complete with a viewing window to allow observation of space. The door is generally in good order. Inspect for any locking problems and make good as required.

Windows

The incubator room has an aluminium frame window. Inspect for any locking problems and failure of seals between the frames and glazing panes. Repair any locking problems and completely replace the seals. Remove and set aside all glazing, clean and repair frames and re-fix glazing panels using a suitable seal.

Engineering services

Mechanical and plumbing works

Inspect the AC and other mechanical works , fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Refurbishment of the light fittings, required power outlets as per the use and general electrical work is specified in detail in the Electrical specification document.

Layout

Walk in incubator to be assembled in the BSL 2 assigned walk in incubator room (refer to attached walk in incubator specification document)

Freezer Room

Floor

The freezer room has an epoxy flooring system in a dilapidated state (refer to architect's plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite 'floors' in the section above

Walls

Inspect for any existing cracks/water ingress and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Suggested options for crack repair, are as per the procedures in BSL2 crack repair work.

Ceiling

The area is fitted with an 'acoustic ceiling' which is generally in good order. Inspect for any damaged and stained tiles and replace. The tile replacement should take place only after the root cause of the damage and/or staining has been identified and remediated. In addition, inspect for any damaged supporting frame remediate and make good as needed.

Refurbishment of the light fittings, fire detection and alarm systems, comfort cooling ceiling cassette is specified in detail in the relevant section or specification.

Doors

The main entrance door is made of timber double leaf opening with a three-sided timber frame and top lights over. The door leaf is complete with a viewing window to allow observation of space. The door is generally in good order. Inspect for any locking problems and make good as required.

Windows

The freezer room has 2 no. aluminium frame windows. Inspect for any locking problems and failure of seals between the frames and glazing panes. Repair any locking problems and completely replace the seals. Remove and set aside all glazing, clean and repair frames and re-fix glazing panels using a suitable seal.

Engineering services

Mechanical and plumbing works

Inspect the AC and other mechanical works , fittings and plumbing works connections within or adjacent to the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Refurbishment of the light fittings, required power outlets as per the use and general electrical work is specified in detail in the Electrical specification document. Provide type G double sockets.

Freezer Room store

Install access control to the existing door, install CCTV, replace existing lights with LED lights and install AC

Microscopes area (Within BSL 2)

General work as per the BSL 2 refurbishment procedure. In addition, install a fume extractor (Specs provided in detail at the relevant section) at the microscopy bench, and design a solution and install a suitable bench top finish that cannot be discoloured by the stains, is chemical proof, very even, durable and easy to clean. Install additional type G power sockets and LMIS connectivity portals with the internet.

Reading area:

General work as per the BSL 2 refurbishment procedure

Design a solution and install a suitable and sustainable bench top finish that cannot be discoloured by the stains, is chemical proof, very even, durable and easy to clean. Install LMIS pots with internet.

Documentation room

Floors

The documentation room has granito tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Inspect for failure in some of the tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls

Inspect for any existing cracks and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Suggested options for crack repair, are as per the procedures in BSL2 crack repair work.

Ceiling

The area is fitted with an ‘acoustic ceiling’ which is generally in good order. Inspect for any damaged and stained tiles and replace. The tile replacement should take place only after the root cause of the damage and/or staining has been identified and remediated. In addition inspect for any damaged supporting frame remediate and make good as needed.

Refurbishment of the light fittings, fire detection and alarm systems, comfort cooling ceiling cassette is specified in detail in the relevant section or specification.

Doors

The main door is made of timber single leaf opening with a three-sided timber frame and top lights over. The door leaf is complete with a viewing window to allow observation of space. The door is generally in good order. Inspect for any locking problems and make good as required.

Windows

The space has aluminium frame windows. Inspect for any locking problems and failure of seals between the frames and glazing panes. Repair any locking problems and completely replace the seals. Remove and set aside all glazing, clean and repair frames and re-fix glazing panels using a suitable seal.

Engineering services

Mechanical and plumbing works

Inspect the AC and other mechanical works , fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Design a solution and install data points and power outlets to serve the 22 workstations as indicated in the Architectural layout. Install a CCTV camera with a clear view of the entire space. Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Miscellaneous

Procure and install 16 workstations indicated in the Architectural layout. The work station details are specified in the relevant section.

Partitioning of 16 staff working stations, CCTV cameras. Ensure each workstation has a lockable drawer for storage of personal items.

Procure the following:

An electric sanitizer dispenser

Clean Room PCR1 (AC)

Floor

PCR1 has an epoxy flooring system in a dilapidated state(refer to architect's plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite 'floors' in the section above

Walls

Procedure and refurbishment to be as set out under the documentation room 'wall' section above

Ceilings

Procedure and refurbishment to be as set out under the documentation room 'ceiling' section above

Doors

Removal of door to facilitate application of new floor and wall finishes. Restore the door to its original state. Procedure and refurbishment to be as set out under the documentation room 'doors' section above

Windows

Procedure and refurbishment to be as set out under the documentation room 'windows' section above

Benching and furniture

Removal of all fixed and portable laboratory benching and all supporting frameworks to facilitate a monolithic application of the new floor and wall finishes. Restore the benching to its initial layout after application of the new floor and wall finishes.

All work tops to have an Epoxy finish application that is chemical proof, smooth and easy to clean.

Engineering services

Mechanical and plumbing works

Inspect the AC and other mechanical works , fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required. Install an elbow operated tap to the existing wash hand basin and sink. ..

Electrical
Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Provide additional type G power sockets and LMIS data points as required to serve the space.

Miscellaneous
Supply and install where applicable the following. The specifications are detailed in the relevant section.

Install gown holding racks

Specimen Prep PCR2 (AC)

Floor
PCR2 has an epoxy flooring system in a dilapidated state(refer to architect's plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite 'floors' in the section above

Walls
Procedure and refurbishment to be as set out under the documentation room 'wall' section above

Ceilings
Procedure and refurbishment to be as set out under the documentation room 'ceiling' section above

Doors
Removal of door to facilitate application of new floor and wall finishes. Restore the door to its original state. Procedure and refurbishment to be as set out under the documentation room 'doors' section above

Windows
Procedure and refurbishment to be as set out under the documentation room 'windows' section above

Benching and furniture
Removal of all fixed and portable laboratory benching and all supporting frameworks to facilitate a monolithic application of the new floor and wall finishes. Restore the benching to its initial layout after application of the new floor and wall finishes. Install an additional work top as per the Architectural layout. The framing and top materials to be as the existing or equivalent. All worktops to have an Epoxy finish application that is chemical proof, smooth and easy to clean.

Engineering services
Mechanical and plumbing works
Inspect the AC and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required. Replace the existing sink with a sink of similar width and depth but a length of 900mm.Install an elbow operated tap to the existing wash hand basin and the new sink.

Electrical

Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Provide additional type G sockets and data points as required to serve the space.

Miscellaneous

Supply and install where applicable the following (The specifications are detailed in the relevant section)

Install gown holding racks, paper towel dispensers, mirrors, an electric sanitizer dispenser

Install emergency eye wash at the sink. Install a larger sink of size 450*900cm. Install glove holding cabinet: open and with three shelves each measuring 30*15cm.

PCR3 (AC)

Floor

PCR3 has an epoxy flooring system in a dilapidated state (refer to architect's plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite 'floors' in the section above

Walls

Procedure and refurbishment to be as set out under the documentation room 'wall' section above

Ceilings

Procedure and refurbishment to be as set out under the documentation room 'ceiling' section above

Doors

Removal of door to facilitate application of new floor and wall finishes. Restore the door to its original state. Procedure and refurbishment to be as set out under the documentation room 'doors' section above

Windows

Procedure and refurbishment to be as set out under the documentation room 'windows' section above

Benching and furniture

Removal of all fixed and portable laboratory benching and all supporting frameworks to facilitate a monolithic application of the new floor and wall finishes. Restore the benching to its initial layout after application of the new floor and wall finishes. All worktops to have an Epoxy finish application that is chemical proof, smooth and easy to clean.

Additional worktop as per the Architectural plan layout. The specifications in terms of materials and sizes of the structural framework should be as that of the existing benches

Engineering services

Mechanical and plumbing works

Inspect the AC and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required. Install an elbow operated tap to the existing wash hand basin.

Electrical

Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Provide additional type G power outlets and LMIS data points as required to serve the space.

Miscellaneous
Supply and install the following. The specifications are detailed in the relevant section.

Install gown holding racks.

Install emergency eye wash at the sink. Install glove holding cabinet: open and with three shelves each measuring 30*15cm.

Decontamination and Glassware washing

Layout
Partition Decontamination room to have an extra clean laboratory (External Quality Assurance material production and preparation) as indicated in the Architectural layout. Carefully remove the existing workbenches and install new ones as per the layout. The structural frame of the benches should be as the existing PCR 1, 2,and 3).All worktops to have an Epoxy finish application that is chemical proof, smooth and easy to clean.

Floor
Decontamination and glassware washing has an epoxy flooring system in a dilapidated state (refer to architect's plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite 'floors' in the section above

Walls
Procedure and refurbishment to be as set out under the documentation room 'wall' section above

Ceilings
Procedure and refurbishment to be as set out under the documentation room 'ceiling' section above

Doors
Removal of door to facilitate application of new floor and wall finishes. Restore the door to its original state. Procedure and refurbishment to be as set out under the documentation room 'doors' section above. Install access control mechanism to the main entrance door(D13) of decontamination and glassware room.

Windows
Procedure and refurbishment to be as set out under the documentation room 'windows' section and BSL 3 'windows' section above for the created laboratory.

Benching and furniture
Installation of all fixed and portable laboratory benching and all supporting frameworks only after application of the new floor and wall finishes. Restore the benching to its initial layout after application of the new floor and wall finishes.

All Newly created worktop to have an Epoxy finish application that is chemical proof, smooth and easy to clean.

The existing retained terrazzo finish worktops and dwarf walls to be repaired, cleaned and polished.

Engineering services
Mechanical and plumbing works

Inspect the AC and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required. Install an elbow operated tap to the wash hand basin, sink and eye wash station attached to the sink.

Electrical
Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Provide type G power outlets and LMIS data points as required to serve the newly created laboratory. Install a CCTV camera(s) with a clear view of the entire space

Miscellaneous
Supply and install the following. The specifications are detailed in the relevant section.

Glassware washing: Introduce racks to dry glassware, stainless steel storage cabinets, LMIS ports with internet at the staff desk.

Install two more three-phase power points for the hot air oven and the decontamination autoclave

Install ACs, access control, LED lighting, CCTV

Install stainless steel racks for storage of glassware where the staff will sit.

Sterile store:

Floor
Sterile store has an epoxy flooring system in a dilapidated state(refer to architect's plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite 'floors' in the section above.

Walls
Procedure and refurbishment to be as set out under the documentation room 'wall' section above

Ceilings
Procedure and refurbishment to be as set out under the documentation room 'ceiling' section above

Doors
Removal of door to facilitate application of new floor and wall finishes. Restore the door to its original state. Procedure and refurbishment to be as set out under the documentation room 'doors' section above. Install access control mechanism to the main entrance door(D4) of sterile store.

Windows
Procedure and refurbishment to be as set out under the documentation room 'windows' section above

Benching and furniture
Removal of all fixed and portable laboratory benching and all supporting frameworks to facilitate a monolithic application of the new floor and wall finishes. Restore the benching to its initial layout after application of the new floor and wall finishes. All worktops to have an Epoxy finish application that is chemical proof, smooth and easy to clean.

Engineering services
Mechanical and plumbing works

Inspect the AC and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required. Install an elbow operated tap to the existing wash hand basin.

Electrical
Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, where applicable as is specified in detail in the Electrical specification document. Install a CCTV camera with a clear view of hallway and access doors to decontamination and sterile storerooms.

Media Preparation room

Floor
Media preparation room has an epoxy flooring system in a dilapidated state (refer to architect's plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite 'floors' in the section above

Walls
Procedure and refurbishment to be as set out under the documentation room 'wall' section above

Ceilings
Procedure and refurbishment to be as set out under the documentation room 'ceiling' section above

Doors
Removal of door to facilitate application of new floor and wall finishes. Restore the door to its original state. Procedure and refurbishment to be as set out under the documentation room 'doors' section above. Install access control to the main entrance door (D14) to the media room. Refurbish the transition door and its frame to open both ways. Carefully remove the existing heavy equipment access door, build up 150mm thick machine dwarf wall to window-sill level of existing windows, plaster both inside and outside as required to achieve seamless wall surface texture and level. Install an aluminium frame window with the design, materials and glazing as the existing adjacent window. Carefully remove part of the walling and cart away, plaster around the opening and wall surfaces affected to create an opening of 1800mm width and a height to beam soffit for a new heavy equipment door. Aluminium frame double leaf door installation at the indicated position in the Architectural layout. The heavy equipment door specs to be as the removed one.

Windows
Procedure and refurbishment to be as set out under the documentation room 'windows' section above. Introduction of new window as per the procedure in the door section above.

Benching and furniture
Removal of all fixed and portable laboratory benching and all supporting frameworks to facilitate a monolithic application of the new floor and wall finishes. Restore the benching to its initial layout after application of the new floor and wall finishes. All worktops to have an Epoxy finish application that is chemical proof, smooth and easy to clean.

Engineering services
Mechanical and plumbing works
Inspect the AC and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required. Install elbow operated taps to the existing wash hand basin and sinks.

Electrical
Refurbishment of the light fittings, power outlets, general electrical work, data points connection, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Miscellaneous
Supply and install the following. The specifications are detailed in the relevant section.

Media Preparation: Annex 3
Install:

Wall shelves

Fume chamber

Gown holding rack

Repair the ACs, install Access control, replace existing lights with LED lights, install CCTV, install LMIS with internet provision,

Sterile store - Media room sterile storage
Floor
Media room sterile storage room has an epoxy flooring system in a dilapidated state(refer to architect's plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite 'floors' in the section above

Walls
Procedure and refurbishment to be as set out under the documentation room 'wall' section above

Ceilings
Procedure and refurbishment to be as set out under the documentation room 'ceiling' section above

Doors
Removal of door to facilitate application of new floor and wall finishes. Restore the door to its original state. Procedure and refurbishment to be as set out under the documentation room 'doors' section.

Windows
Procedure and refurbishment to be as set out under the documentation room 'windows' section.

Racks and furniture
Removal of all fixed and portable racking to facilitate a monolithic application of the new floor and wall finishes. Restore the racking to its initial layout after application of the new floor and wall finishes.

Engineering services
Mechanical and plumbing works
Inspect the AC and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Where applicable, refurbishment of the light fittings, power outlets, general electrical work, data points connection, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Miscellaneous
Supply and install the following. The specifications are detailed in the relevant section.

Stainless steel racks, lighting.

Archive Room
Floor
The Archive room for the media preparation area has an epoxy flooring system in a dilapidated state (refer to architect's plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite 'floors' in the section above

Walls
Procedure and refurbishment to be as set out under the documentation room 'wall' section above

Ceilings
Procedure and refurbishment to be as set out under the documentation room 'ceiling' section above

Doors
Removal of door to facilitate application of new floor and wall finishes. Restore the door to its original state. Procedure and refurbishment to be as set out under the documentation room 'doors' section.

Windows
Procedure and refurbishment to be as set out under the documentation room 'windows' section.

Filing cabinets and furniture
Removal of all fixed and portable filing cabinets to facilitate a monolithic application of the new floor and wall finishes. Restore the filing cabinets to its initial layout after application of the new floor and wall finishes.

Engineering services
Mechanical and plumbing works
Inspect the AC and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical
Where applicable, refurbishment of the light fittings, power outlets, general electrical work, data points connection, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Miscellaneous
Supply and install the following.

Archive room to have additional stainless-steel cabinets to store the files. Provision for the basement cleaner room to be extended as an archive. To be fitted with stainless steel cabinets for storing the files. Storage areas, CCTV and access control.

General Areas

Remove extinguishers and other items stored in the fire duct and repair the door.

Repair the main lift entrance, adding granite around the door. Repair the service duct door and remove debris.

Fire escape lobby, staircase and door

Floor

The fire escape lobby area has a terrazzo flooring system. The floor is generally in good order. Inspect for any repairs that need to be done, clean and polish as required.

Walls

Procedure and refurbishment to be as set out under the documentation room ‘wall’ section above

Ceilings

The ceiling at the lobby is plastered and painted slab soffit. It is generally in good order. Inspect for any leakage effects, cracks or effects as a result of work on the wall as per the procedure in the ‘walls’ above. Identify the root cause and design a solution and install as required.

Doors

Carefully remove the existing door and replace with a designed and required fire escape emergency door of similar size.

Design and install a clear label on the door.

Windows

There are no windows in the fire escape staircase/lobby. No action needed.

Engineering services

Mechanical and plumbing works

Inspect the AC and other mechanical works, fittings and plumbing works connections within or affecting the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Where applicable, refurbishment of the light fittings, power outlets, general electrical work, data points connection, fire detection and alarm systems, is specified in detail in the Electrical specification document. Install CCTV camera at approved convenient area with a clear view of the staircase and fire exit door. Ensure adequate lighting within the lobby.

Miscellaneous

Add signages showing ‘EXIT’, safety signages at approved convenient positions.

Hallway between Grids 7 and 10 (BSL 3 and (PCR 1, 2 and 3)

Floor

The hallway has an epoxy flooring system in a dilapidated state (refer to architect’s plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite ‘floors’ in the section above

Walls
Procedure and refurbishment to be as set out under the documentation room ‘wall’ section above

Ceilings
Procedure and refurbishment to be as set out under the documentation room ‘ceiling’ section above

Doors
Removal of affected doors to facilitate application of new floor and wall finishes. Procedure and refurbishment to be as set out under the documentation room ‘doors’ section above. Replace the doors and frames to ensure that the doors swing on both sides.

Engineering services
Mechanical and plumbing works
Inspect the AC and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical
Where applicable, refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Hallway between grids 3 and 7 (BSL 2 and (Documentation room and Toilets)

Floor
This hallway has granito tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Inspect for failure in some of the tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls
Procedure and refurbishment to be as set out under the documentation room ‘wall’ section above

Ceilings
Procedure and refurbishment to be as set out under the documentation room ‘ceiling’ section above

Doors
Removal of affected doors to facilitate application of new floor and wall finishes. Procedure and refurbishment to be as set out under the documentation room ‘doors’ section above. Replace the doors and frames to ensure that the doors swing on both sides.

Engineering services
Mechanical and plumbing works
Inspect the AC and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required.
Electrical
Where applicable, refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Miscellaneous
Replace the existing notice board with a larger one of size 200*200cm.

Lobby between fire escape staircase and Hallway

Floor

This lobby has granito tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Inspect for failure in some of the tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls

Procedure and refurbishment to be as set out under the documentation room ‘wall’ section above

Ceilings

Procedure and refurbishment to be as set out under the documentation room ‘ceiling’ section above

Doors

Procedure as per the ‘door’ section in adjacent spaces.

Engineering services

Mechanical and plumbing works

Inspect the AC and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Where applicable, refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Chemical store

Floor

The Chemicals store has granito tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Inspect for failure in some of the tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls

Procedure and refurbishment to be as set out under the documentation room ‘wall’ section above

Ceilings

Procedure and refurbishment to be as set out under the documentation room ‘ceiling’ section above

Doors

Removal of affected doors to facilitate application of new floor and wall finishes. Procedure and refurbishment to be as set out under the documentation room ‘doors’ section above.

Benching and furniture

Removal of all portable storage shelves/racks/cabinets to facilitate a monolithic application of the new floor and wall finishes. Restore the shelving to its initial layout after application of the new floor and wall finishes.

Engineering services

Mechanical and plumbing works

Inspect the AC and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Where applicable, refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Miscellaneous

1. Provision of Chemical storage cabinets
2. Provision of toxic flammable chambers

Cleaners room

Floor

The Cleaners has granito tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Inspect for failure in some of the tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls

Procedure and refurbishment to be as set out under the documentation room ‘wall’ section above

Ceilings

Procedure and refurbishment to be as set out under the documentation room ‘ceiling’ section above

Doors

Removal of affected doors to facilitate application of new floor and wall finishes. Procedure and refurbishment to be as set out under the documentation room ‘doors’ section above.

Benching and furniture

Removal of all fixed and portable laboratory benching and all supporting frameworks to facilitate a monolithic application of the new floor and wall finishes. Restore the benching to its initial layout after application of the new floor and wall finishes. All worktops to have an Epoxy finish application that is chemical proof, smooth and easy to clean. The existing sink should have an elbow operated tap.

Engineering services

Mechanical and plumbing works

Inspect the AC and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Where applicable, refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document. Install type G sockets, and an LED lighting.

Miscellaneous

Cleaning detergent and additional consumables Storage cabinets,

Waste holding bay

Floor

The waste holding bay has granito tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Inspect for failure in some of the tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls

Procedure and refurbishment to be as set out under the documentation room ‘wall’ section above

Ceilings

Procedure and refurbishment to be as set out under the documentation room ‘ceiling’ section above

Engineering services

Mechanical and plumbing works

Inspect the AC and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Where applicable, refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Miscellaneous

Supply and install the following. The specifications are detailed in the relevant section

Provide trolleys to hold the waste

The Lift and main staircase lobby, exterior of lift core,stairwell walls, floor and ceiling

Floor

This lobby has granito tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Inspect for failure in some of the tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls

Procedure and refurbishment to be as set out under the documentation room ‘wall’ section. The uneven and scratched surface around lift door to be made good through plastering to achieve even and smooth surface. Design and install a solution to avoid the problem recurring again.

Ceilings

Procedure and refurbishment to be as set out under the documentation room ‘ceiling’ section above

Doors

Procedure as per the ‘door’ section in adjacent spaces.

Engineering services

Mechanical and plumbing works

Inspect the AC and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Where applicable, refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document. Install CCTV camera with a clear view of the space.

Miscellaneous

Add signages showing 'EXIT', safety signages at approved convenient positions. Add Mission, vision, values and quality policies.

Office and support areas:

This applies to the Management office which houses the following rooms:

1. Head NTRL

2. Deputy manager/EQA coordinator

3. Data entry office/boardroom

Floor

The office and support areas has granito tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Inspect for failure in some of the tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls

Procedure and refurbishment to be as set out under the documentation room 'wall' section above

Ceilings

Procedure and refurbishment to be as set out under the documentation room 'ceiling' section above

Doors

Removal of affected doors to facilitate application of new floor and wall finishes. Procedure and refurbishment to be as set out under the documentation room 'doors' section above. The main door to be access controlled.

Windows

Procedure and refurbishment to be as set out under the documentation room 'windows' section above

Benching and furniture

Removal of all portable furniture, storage shelves/racks/cabinets to facilitate a monolithic application of the new floor and wall finishes. Restore the shelving to its initial layout after application of the new floor and wall finishes.

Engineering services

Mechanical and plumbing works

Inspect the AC and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required. Design and install an approved functioning air conditioning system to serve the space.

Electrical

Where applicable, refurbishment of the light fittings, power outlets, general electrical work, access control, fire detection and alarm systems, is specified in detail in the Electrical specification document. Install CCTV camera with a clear view of the boardroom area, and its exit/entrance. Install type G sockets and LMIS data points as to serve the space users.

Miscellaneous

Supply and install the following. The specifications are detailed in the relevant section

provision of an electric sanitizer dispenser, replace the fire alarm, A wider notice board to fit the QMS documentation,

Lockable cabinets and shelves, power sockets (type G), LMIS with internet, Office for in charge

Provision of a power double sockets (type G), wall clock, LMIS with internet provision.

Toilet facilities

Floor

The toilet space has ceramic tiles flooring and walling system (refer to architects plans for areas covered by the granito tiles flooring system)

Inspect for failure in some of the tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls

Procedure and refurbishment to be as set out for tile repair work.

Ceilings

Procedure and refurbishment to be as set out under the documentation room ‘ceiling’ section above

Doors

Procedure and refurbishment to be as set out under the documentation room ‘doors’ section above.

Windows

Procedure and refurbishment to be as set out under the documentation room ‘windows’ section above

Layout

Convert one of the toilets on either gender side to a shower. as indicated in the Architectural layout.

Remove the existing shower in special wc’s to revert it to its intended functioning.

Design an approved layout including supporting rails for the Special WCs and install for the toilets to qualify as a special WC's.

Engineering services

Mechanical and plumbing works

Inspect for air circulation, adequacy in ventilation and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause, design and propose a solution for approved air quality within the toilets and repair as required. Install elbow operated/sensor taps in the toilets.

Electrical

Where applicable, refurbishment of the light fittings and general electrical work is specified in detail in the Electrical specification document.

Miscellaneous

Supply and install the following. The specifications are detailed in the relevant section

Female and Male: Repair lockers outside the washrooms and change them to smaller sizes to accommodate 20 units. Install a shoe rack at the bottom with two shelves. Addition of toilet paper holders in each toilet (male and female), installation of paper towel dispensers in each toilet (male and female), mirrors, dustbins for waste, and charting holders for the cleaners. Add an electric sanitizer dispenser in each. Convert one of the toilets to a shower.

Special WCs: installation of paper towel dispensers, mirrors, dustbins for waste, and charting holders for the cleaners. Add an electric sanitizer dispenser, remove the shower to allow the toilet to be functional.

Lobby/stairwell/lift:

Along the light wall install stainless steel sheets to prevent the walls from chopping.

Other areas

Ducts

Inspect all doors to all existing ducts, identify any problems and repair to function as required.

Inspect all pipework and connections within the ducts, test their functionality and make good in case of any problems.

Fire extinguishers

Inspect and design a solution for fire extinguishers installation within the entire floor in terms of adequacy and positioning to achieve the desired performance. Factor in the existing installed extinguishers and the ones in the ducts.

Fire hose reel

Inspect and test the hose reel (within the ducts, ground floor level, roof terraces) for performance, pipework size and adequacy.

First Floor: National Virology Reference Laboratory (NVRL)

BSL3 Laboratory Suite: NVRL (including anteroom) – Emerging and Re-emerging diseases

Floors

Requirement for floor renovations is as described for the NTRL BSL3 laboratory suite.

Walls

Requirement for wall renovations is as described for the NTRL BSL3 laboratory suite.

Ceilings

The ceilings in the NVRL BSL3 laboratory suite are substantially different to those in the NTRL BSL3 laboratory suite and so will require a slightly different treatment. They have a dropped bulkhead containing ductwork which serves a different arrangement of supply and extract grilles.

It is understood (requires investigation and confirmation) that the supply ductwork system and potentially also the extract ductwork system installations are sub-standard and unable to pass the needed ductwork leakage and sealability testing. It may therefore be necessary to completely redesign the NVRL BSL3 laboratory suite ceiling system if access to remove existing and reinstall new supply and extract ductwork systems is required. This may also extend to the vertical risers and the 'duct room' indicated on the first-floor plan (and duct risers at 2nd and 3rd floors).

One possible solution may be to remove the ceilings back to the RC slab (so a similar finish as the second floor NTRL BSL3 laboratory suite) and then install exposed supply and extract ductwork at high level in the NVRL BSL3 laboratory suite, complete with all needed regulating, controlling, distribution and terminal devices. This may also include the proposed new terminal HEPA filters and associated housings.

These options will need to be explored during the detailed design phase of the project.

Doors and entry points:

Doors and entry points

The NVRL BSL3 suite has 3 doors. There are two no. anteroom doors (one outer and one inner), and one set of double doors designed for the delivery and removal of large equipment. Install CCTV and Access control

Anteroom doors

Requirement for Ante room renovations is as described for the NTRL BSL3 laboratory suite.

Equipment doors

Requirement for equipment door renovations is as described for the NTRL BSL3 laboratory suite

Proposed pass-through window/ pass through box

To facilitate the admission of samples etc. a pass box is proposed to be installed in the position indicated on the architects' drawings in the larger wall adjacent to the equipment access doors.

Requirement for the pass-through window is as described for the NTRL BSL3 laboratory suite

Windows

The NVRL BSL3 suite has 3 external window openings on the west external façade of the building. Requirement for the window is as described for the NTRL BSL3 laboratory suite

Benching and furniture

Removal all fixed and portable laboratory benching and all supporting frameworks (except existing dwarf walls) to facilitate a monolithic application of the new floor and wall finishes. The benching layout should be maintained as it is after floor and wall application.

Laboratory Bench tops:

All benchtops should be made of granite (Off white) matching the walls; Economically suitable as per the laboratory standards. Must be a seamless one-piece design to prevent contamination. Penetrations for electrical, plumbing, and other considerations must be completely and permanently sealed. Must have a backsplash against the wall. Walls should be painted with washable, hard non-porous paints. The color will be off-white. Thoroughly clean all surfaces to remove dust, dirt, oil, grease, and any other contaminants before painting. Sand or smooth any rough areas as needed. Fill any cracks or holes with an appropriate filler, ensuring the surface is smooth and uniform. Prime surfaces as required to ensure proper adhesion of the paint. Apply one coat of the primer using a brush, roller, or spray as required, ensuring uniform coverage. Allow the primer to dry completely before applying the first coat of finish paint. Apply two coats of finish paint, ensuring proper drying time between coats (as per manufacturer's recommendations).Each coat must be evenly applied to provide a uniform finish, free from runs, streaks, or defects. All work must be inspected for coverage consistency, uniformity, and finish quality ensuring that all surfaces are free from drips, smears, and visible brush strokes after application, and that paint colour and sheen meet project specifications.

Anteroom lockers, cupboards and stepover bench provision

As indicated on the architectural layouts, provide storage lockers or cupboards on each side of a new stepover bench for the storage of clean and dirty laboratory garments and PPE.Requirement for Anteroom lockers, cupboards and step over bench is as described for the NTRL BSL3 laboratory suite

Waste Management

Autoclave – pass through BSL3 Autoclave – loading side

Requirement for Autoclave is as described for the NTRL BSL3 laboratory suite

Engineering services

Mechanical

Requirement for mechanical services is as described for the NTRL BSL3 laboratory suite

NVRL BSL3 Laboratory HVAC recirculation system

Requirement for NVRL BSL3 laboratory HVAC recirculation system is as described for the NTRL BSL3 laboratory suite

Electrical

Requirement for electrical services is as described for the NTRL BSL3 laboratory suite

Plumbing and drainage

The existing NVRL BSL3 laboratory suite is equipped with a proprietary Vulcathene drainage system including laboratory sinks, dilution traps and Vulcathene mechanical piping systems.Requirement for electrical services is as described for the NTRL BSL3 laboratory suite

Controls and instrumentation

Requirement for control and instrumentation is as described for the NTRL BSL3 laboratory suite

Access controls and security

Provide a completely new access control system for the NVRL BSL3 laboratory suite which should be integrated into the building wide access control system allowing tiered security and access control from the external entry points into the BSL3 suites via the BSL2 suites.

Fire detection and alarm systems
Requirement for fire detection and alarm systems is as described for the NTRL BSL3 laboratory suite.

Intruder detection and alarm systems
Requirement for intruder detection and alarm systems is as described for the NTRL BSL3 laboratory suite.

Miscellaneous

Uninterruptable power supplies: UPS
Uninterruptable power supplies for Biosafety Cabinets (BSCs). Ensure each BSC is powered by an adequate UPS system to ensure safe operation and shutdown under control in the event of an emergency.

BSL2 Laboratory Suite: NVRL(All areas including PCRs, sample processing areas, V/L, EID,Specimen receiving, routine bacteriology)

Floors

The NVRL BSL2 laboratory suite has the same contiguous epoxy flooring system that serves the NVRL BSL3 laboratory suite and laboratory support areas (refer to architects plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite ‘floors’ section.

Walls

The NVRL BSL2 laboratory suite walls have a different paint finish to the NVRL BSL3. Requirement for walls is as described for the NTRL BSL2 laboratory suite.

Ceilings

The NVRL BSL2 laboratory suite and most supporting areas is fitted with an ‘acoustic ceiling’ (contains small sound absorbent fissures in its visible surface). It is generally in good order, but all damaged and stained tiles are to be replaced. Requirement for ceiling is as described for the NTRL BSL2 laboratory suite.

Doors and entry points

All doors are made of timber with a three-sided timber frame and top lights over. The door leafs are complete with a viewing window to allow observation of space. The doors are generally in good order. Removal of doors to facilitate application of new floor and wall finishes.’ Inspect for any locking problems and make good as required.

Windows

The space has aluminium frame windows. Inspect for any locking problems and failure of seals between the frames and glazing panes. Repair any locking problems and completely replace the seals. Remove and set aside all glazing, clean and repair frames and re-fix glazing panels using a suitable robust seal. Windows in the PCRs, V/L and EID spaces to be lightly tinted due to afternoon light.

Reception window to be replaced with a pass box. Repair and extend the reception window with a passbox. Extend the epoxy finish bench tops on both sides of the passbox to accommodate an area where samples can be placed.

Benching and furniture

Removal all fixed and portable laboratory benching and all supporting frameworks including furniture to facilitate a monolithic application of the new floor and wall finishes. The benching layout should be maintained as it is after floor and wall application.

All working tops to be replaced with Epoxy finish bench tops materials that are smooth and easy to clean. Firm enough to hold auxiliary equipment like bench centrifuges.

Waste Management:

Provision for 20 litres foot pedal waste Bin at each side of a BSC (xx), in addition, waste holding racks used inside the BSC (at least two in each BSC)

Autoclaves:

Two Stand-alone autoclaves, one at the BSL 3 and the Other at BSL 2 to decontaminate the waste before it leaves the laboratory?

Service and repair the existing pass through autoclave as earlier described.

Engineering services:

Mechanical

Mechanical and plumbing works

Inspect the AC and other mechanical works and fittings in all spaces for any problems, leakages, failure or performance as required, identify the root cause and repair as accordingly.

Electrical

Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the relevant specification document.

Plumbing and drainage

The existing NVRL BSL2 laboratory suite is equipped with a proprietary Vulcathene drainage system including laboratory sinks, dilution traps and Vulcathene mechanical piping systems. Inspect the plumbing and drainage connections within the space, for any problems or leakages, identify the root cause and repair as required. Install elbow operated tap to the existing wash hand basins(7).

Toilet facilities

Floor

The toilet space has ceramic tiles flooring and walling system (refer to architects plans for areas covered by the granito tiles flooring system)

Inspect for failure in any of the laid tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls

Procedure and refurbishment to be as set out for tile repair work.

Ceilings

Procedure and refurbishment to be as set out under the BSL 2 NVRL ‘ceiling’ section.

Doors and entry points

All doors are made of timber with a three-sided timber frame. Inspect for any locking problems and make good as required.

Windows
The space has aluminium frame windows. Inspect for any locking problems and failure of seals between the frames and glazing panes. Repair any locking problems and completely replace the seals. Remove and set aside all glazing, clean and repair frames and re-fix glazing panels using a suitable seal.

Layout
Design an approved layout including supporting rails for the Special WCs and install for the toilets to qualify as a special WC's.

Engineering services
Mechanical and plumbing works
Inspect for air circulation, adequacy in ventilation and other mechanical works, fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause, design and propose a solution for approved air quality within the toilets and repair as required. Install elbow operated/sensor taps in both gents and ladies toilets.

Electrical
Refurbishment of the light fittings and general electrical work is specified in detail in the Electrical specification document. Inspect and identify causes of failure of electrical fittings and repair as required.

Addition of toilet paper holders in each toilet (gents and female), installation of paper towel dispensers in each toilet (gents and ladies), provision of mirrors, dustbins for waste, and charting holders for the cleaners. Add an electric sanitizer dispenser in each space (gents and ladies)

QA room/NHRL/NVRL office
Floors
The HIVRL office has granito tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Inspect for failure in some of the tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls
Inspect for any existing cracks and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Suggested options for crack repair, are as per the procedures in BSL2 crack repair work.

Ceiling
The area is fitted with an ‘acoustic ceiling’ which is generally in good order. Inspect for any damaged and stained tiles and replace. The tile replacement should take place only after the root cause of the damage and/or staining has been identified and remediated. In addition inspect for any damaged supporting frame remediate and make good as needed.

Refurbishment of the light fittings, fire detection and alarm systems, comfort cooling ceiling cassette is specified in detail in the relevant section or specification.Inspect and ensure that systems function as required.

Doors
The main door is made of timber double leaf opening with a three-sided timber frame and top lights over. The door leaf is complete with a viewing window to allow observation of space. The door is generally in good order. Inspect for any locking problems and make good as required.

Windows
The space has aluminium frame windows. Inspect for any locking problems and failure of seals between the frames and glazing panes. Repair any locking problems and completely replace the seals. Remove and set aside all glazing, clean and repair frames and re-fix glazing panels using a suitable seal.

Engineering services
Mechanical and plumbing works
Inspect the AC and other mechanical works , fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical
Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Data Entry Room
Floors
The QA room has granito tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Requirement for floor is as described for the HIVRL Office

Walls
Requirement for walls is as described for the HIVRL Office

Ceiling
Requirement for ceiling is as described for the HIVRL Office

Doors
Requirement for door is as described for the HIVRL Office

Windows
Requirement for windows is as described for the HIVRL Office

Engineering services
Mechanical and plumbing works
Requirement for mechanical and plumbing works is as described for the HIVRL Office

Electrical
Requirement for Electrical services is as described for the HIVRL Office

DR Master Mix

Floor

DR Master Mix space has an epoxy flooring system in a dilapidated state(refer to architect's plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite 'floors' section.

Walls

Procedure and refurbishment to be as set out under the HIVRL Office 'wall' section.

Ceilings

Procedure and refurbishment to be as set out under the HIVRL Office 'ceiling' section.

Doors

Removal of door to facilitate application of new floor and wall finishes.Restore the door to its original state.Procedure and refurbishment to be as set out under the HIVRL Office 'doors' section.

Windows

Procedure and refurbishment to be as set out under the HIVRL Office 'windows' section

Benching and furniture

Removal of all fixed and portable laboratory benching and all supporting frameworks to facilitate a monolithic application of the new floor and wall finishes. Restore the benching to its initial layout after application of the new floor and wall finishes.

All work tops to have an Epoxy finish application that is chemical proof, smooth and easy to clean.

Engineering services

Mechanical and plumbing works

Procedure and refurbishment to be as set out under the HIVRL Office 'mechanical and plumbing ' section.

Electrical

Procedure and refurbishment to be as set out under the HIVRL Office 'Electrical' section

Dr testing and sample processing

Floor

DR testing and sample processing space has an epoxy flooring system in a dilapidated state(refer to architect's plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite 'floors' section.

Walls

Procedure and refurbishment to be as set out under the HIVRL Office 'wall' section.

Ceilings

Procedure and refurbishment to be as set out under the HIVRL Office 'ceiling' section.

Doors

Removal of door to facilitate application of new floor and wall finishes.Restore the door to its original state.Procedure and refurbishment to be as set out under the HIVRL Office 'doors' section.

Windows
Procedure and refurbishment to be as set out under the HIVRL Office ‘windows’ section

Benching and furniture
Removal of all fixed and portable laboratory benching and all supporting frameworks to facilitate a monolithic application of the new floor and wall finishes. Restore the benching to its initial layout after application of the new floor and wall finishes.

All work tops to have an Epoxy finish application that is chemical proof, smooth and easy to clean.

Engineering services
Mechanical and plumbing works
Procedure and refurbishment to be as set out under the HIVRL Office ‘mechanical and plumbing ’ section.

Electrical
Procedure and refurbishment to be as set out under the HIVRL Office ‘Electrical’ section

Dr testing amplification:
Floor
DR testing amplification space has an epoxy flooring system in a dilapidated state(refer to architect’s plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite ‘floors’ section.

Walls
Procedure and refurbishment to be as set out under the HIVRL Office ‘wall’ section.

Ceilings
Procedure and refurbishment to be as set out under the HIVRL Office ‘ceiling’ section.

Doors
Removal of door to facilitate application of new floor and wall finishes.Restore the door to its original state.Procedure and refurbishment to be as set out under the HIVRL Office ‘doors’ section.

Windows
Procedure and refurbishment to be as set out under the HIVRL Office ‘windows’ section

Benching and furniture
Removal of all fixed and portable laboratory benching and all supporting frameworks to facilitate a monolithic application of the new floor and wall finishes. Restore the benching to its initial layout after application of the new floor and wall finishes.

All work tops to have an Epoxy finish application that is chemical proof, smooth and easy to clean.

Engineering services
Mechanical and plumbing works
Procedure and refurbishment to be as set out under the HIVRL Office ‘mechanical and plumbing ’ section.

Electrical
Procedure and refurbishment to be as set out under the HIVRL Office ‘Electrical’ section

Dr Post PCR room:

Floor

DR Post PCR room has an epoxy flooring system in a dilapidated state(refer to architect's plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite 'floors' section.

Walls

Procedure and refurbishment to be as set out under the HIVRL Office 'wall' section.

Ceilings

Procedure and refurbishment to be as set out under the HIVRL Office 'ceiling' section.

Doors

Removal of door to facilitate application of new floor and wall finishes.Restore the door to its original state.Procedure and refurbishment to be as set out under the HIVRL Office 'doors' section.

Windows

Procedure and refurbishment to be as set out under the HIVRL Office 'windows' section

Benching and furniture

Removal of all fixed and portable laboratory benching and all supporting frameworks to facilitate a monolithic application of the new floor and wall finishes. Restore the benching to its initial layout after application of the new floor and wall finishes.

All work tops to have an Epoxy finish application that is chemical proof, smooth and easy to clean.

Engineering services

Mechanical and plumbing works

Procedure and refurbishment to be as set out under the HIVRL Office 'mechanical and plumbing ' section.

Electrical

Procedure and refurbishment to be as set out under the HIVRL Office 'Electrical' section

Serology laboratory (Including room 1, room 2 and freezer room):

Floor

Serology laboratory has an epoxy flooring system in a dilapidated state(refer to architect's plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite 'floors' section.

Walls

Procedure and refurbishment to be as set out under the HIVRL Office 'wall' section.

Ceilings

Procedure and refurbishment to be as set out under the HIVRL Office 'ceiling' section.

Doors

Removal of door to facilitate application of new floor and wall finishes.Restore the door to its original state.Procedure and refurbishment to be as set out under the HIVRL Office 'doors' section.

Windows
Procedure and refurbishment to be as set out under the HIVRL Office ‘windows’ section

Benching and furniture
Removal of all fixed and portable laboratory benching and all supporting frameworks to facilitate a monolithic application of the new floor and wall finishes. Restore the benching to its initial layout after application of the new floor and wall finishes.

All work tops to have an Epoxy finish application that is chemical proof, smooth and easy to clean.

Engineering services
Mechanical and plumbing works
Procedure and refurbishment to be as set out under the HIVRL Office ‘mechanical and plumbing ’ section.

Electrical
Procedure and refurbishment to be as set out under the HIVRL Office ‘Electrical’ section

Virology laboratory (Including Haematology and Chemistry section):
Floor
Virology laboratory has an epoxy flooring system in a dilapidated state (refer to architect’s plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite ‘floors’ section.

Walls
Procedure and refurbishment to be as set out under the HIVRL Office ‘wall’ section.

Ceilings
Procedure and refurbishment to be as set out under the HIVRL Office ‘ceiling’ section.

Doors
Removal of door to facilitate application of new floor and wall finishes.Restore the door to its original state.Procedure and refurbishment to be as set out under the HIVRL Office ‘doors’ section.

Carefully remove the existing heavy equipment access door,build up 150mm thick machine dwarf wall to window cill level of existing windows, plaster both inside and outside as required to achieve seamless wall surface texture and level.Install an aluminium frame window with the design,materials and glazing as the existing adjacent window.Carefully remove part of the walling and cart away, plaster around the opening and wall surfaces affected to create an opening of 1800mm width and a height to beam soffit for a new heavy equipment Aluminium frame double leaf door installation at the indicated position in the Architectural layout.The heavy equipment specs to be as the removed one.

Windows
Procedure and refurbishment to be as set out under the HIVRL Office ‘windows’ section. Introduction of new window as per the procedure in the door section above.

Benching and furniture
Removal of all fixed and portable laboratory benching and all supporting frameworks to facilitate a monolithic application of the new floor and wall finishes. Restore the benching to its initial layout after application of the new floor and wall finishes.

All work tops to have an Epoxy finish application that is chemical proof, smooth and easy to clean.

Engineering services

Mechanical and plumbing works

Procedure and refurbishment to be as set out under the HIVRL Office 'mechanical and plumbing ' section.

Electrical

Procedure and refurbishment to be as set out under the HIVRL Office 'Electrical' section

Waste holding bay:

No action to be taken.

Cleaner's room:

No action to be taken.

Chemical store:

No action to be taken.

Fire escape lobby, staircase and door

Procedure and refurbishment to be as set out in all sections of the 'Fire escape lobby, staircase and door' in second floor level.

Emergency doors to be labelled appropriately.

Hallway between grid 6 and 10

Procedure and refurbishment to be as set out in all sections of the 'Hallway between BSL 3 and (PCR 1, 2 and 3)' in second floor level.

Hallway between grid 3 and 6

Procedure and refurbishment to be as set out in all sections of the 'Hallway between BSL 2 and (Documentation room and Toilets)' in second floor level.

Lobby between fire escape staircase and Hallway

Floor

This lobby has an epoxy flooring system in a dilapidated state (refer to architect's plans for areas covered by the epoxy flooring system). All areas are to be refurbished as set out under the NTRL BSL3 laboratory suite 'floors' section.

Procedure and refurbishment to be as set out in other sections of the 'Lobby between fire escape staircase and Hallway' in second floor level.

The Lift and main staircase lobby, exterior of lift core, stairwell walls, floor and ceiling

Procedure and refurbishment to be as set out in all sections of the 'The Lift and main staircase lobby, exterior of lift core, stairwell walls, floor and ceiling' in second floor level.

Other areas

Ducts

Procedure and refurbishment to be as set out in the 'ducts' section in second floor level.

Fire extinguishers

Procedure and refurbishment to be as set out in the ‘fire extinguisher’ section in second floor level.

Fire hose reel

Procedure and refurbishment to be as set out in the ‘fire hose reel’ section in second floor level.

Ground Floor:

Main entrance foyer

Layout

This will be converted to a waiting area (1) for visitors as per the attached Architectural layout.

Floors

The main entrance foyer has granito tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Inspect for failure in some of the tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls

Inspect for any existing cracks and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Suggested options for crack repair, are as per the procedures in BSL2 crack repair work.

Install aluminium frame and glazing(one way) wall as indicated in the Architectural layout.

Ceiling

The area will be fitted with an ‘acoustic ceiling’.

Light fittings, fire detection and alarm systems are specified in detail in the relevant section or specification. The connection and fittings should correspond to the specifications provided

Doors

The main door accessed from the external ra/steps landing will be made of aluminium frame and glazing(one way) and will slide as indicated in the architectural layout. The door will have access control.

Windows

Design and install aluminium frame windows within the Installed aluminium frame and glazing(one way) wall as indicated in the Architectural layout.

Engineering services

Mechanical and plumbing works

Inspect the plumbing works connections within or adjacent to the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical
Repair and enhance lighting and install CCTV camera with a clear view of the space and mispace and main entrance. design and install a horizontal duct and Install power sockets and data points.

Refurbishment of the light fittings,power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Miscellaneous
computers with internet and provide ducting for cables, Entrance

Remove the old BSC NPHRL/EQP/102

Close out the space by installing glass on the outer open side to keep out dust and rain.

Main reception

Layout
The current reception will become a waiting area (2) as per the attached Architectural layout.

The existing receptionist station will be converted to a parcel and document collection station through an aluminium frame and glazing (One way) partition as per the attached Architectural layout. design and Install shelves for storage.

Floors
The main entrance foyer has granito tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Inspect for failure in some of the tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls
Inspect for any existing cracks and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Suggested options for crack repair, are as per the procedures in BSL2 crack repair work.

Ceiling
The area is fitted with an ‘acoustic ceiling’ which is generally in good order. Inspect for any damaged and stained tiles and replace. The tile replacement should take place only after the root cause of the damage and/or staining has been identified and remediated. In addition inspect for any damaged supporting frame remediate and make good as needed.

Refurbishment of the light fittings, fire detection and alarm systems, comfort cooling ceiling cassette is specified in detail in the relevant section or specification.Inspect and ensure that systems function as required.

Doors
The current entrance door will be shifted to the right as indicated in the layout, and expanded to 1500mm width. It will be a one-side sliding aluminium frame and glazing(one way) door with a sensor, and will have access control.

The exit door that currently opens to the veranda will be the specimen reception door.Install a label.

Windows

The space has aluminium frame windows. Inspect for any locking problems and failure of seals between the frames and glazing panes. Repair any locking problems and completely replace the seals. Remove and set aside all glazing, clean and repair frames and re-fix glazing panels using a suitable seal.

Engineering services

Mechanical and plumbing works

Inspect the plumbing works connections within or adjacent to the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Repair and enhance lighting and install CCTV camera with a clear view of the main space and entrance. design and install a horizontal duct and Install power sockets and data points

Refurbishment of the light fittings,power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Install a desk next to the exit door to control flow of traffic to the specimen reception area.

Install two movable cabinets positioned as indicated in the layout.

Veranda

Layout

Part of the verandah to be included in this specimen receiving area(refer to Specimen receiving room, layout section)

Design and Install an Aluminium frame and glazing partition/walling to secure the specimen receiving area(refer to the Architectural layout).install a door and window as described in ‘door’ and ‘window’ section.

Floors

The verandah area has ceramic tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Inspect for failure in some of the tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls

Inspect for any existing cracks and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Suggested options for crack repair, are as per the procedures in BSL2 crack repair work.

Ceiling

The ceiling at the verandah is plastered and painted slab/beam soffit.It is generally in good order. Inspect for any leakage effects, or effects as a result of work on the wall as per the procedure in the 'walls' above.Identify the root cause and design a solution and install as required.

Refurbishment of the light fittings, fire detection and alarm systems, comfort cooling ceiling cassette is specified in detail in the relevant section or specification.Inspect and ensure that systems function as required.

Doors

The main door from the main reception is made of timber double is single opening with a three-sided timber frame and top lights over. The door is generally in good order. Inspect for any locking problems and make good as required.Install a 900mm width door from the specimen receiving area to the remaining Verandah area created partition wall as described in layout section.

Carefully remove the existing doors at the extreme end of the verandah to the BMS room and seal off the space with adequate thickness of walling, plastered and painted.to match the entire walling in paint, level, smoothness and finish.(refer to the Architectural plan)

Windows

Install an Aluminium frame and glazing window on the existing dwarf wall of the secured specimen receiving window. The window to fill up the entire space, its design and pattern to be as the existing window at the main reception.

Pass through box

Create a pass through box within the existing aluminium window of the specimen receiving room as indicated in the layout..Install a top and finish with epoxy at the pass through box.

The specifications are as per the pass through box in first and second floor

Engineering services

Mechanical and plumbing works

Inspect mechanical works , fittings and plumbing works connections within or adjacent to the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Design and install trunking with type G power outlets(sockets) to serve the space.

Design and Install lighting as required

Refurbishment of the light fittings,power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Specimen receiving Room

Layout

Part of the verandah to be included in this space(refer to Verandah, layout section)

Install a workbench with epoxy top finish at the indicated area of the room for paperwork(refer to the Architectural layout).The workbench specifications to be as the existing in BSL 2, first floor.

Remove the old BSC NPHRL/EQP/102.Introduce of BSC at the designated area of the room(refer to the Architectural plan)

Create a pass through box within the existing aluminium window connecting with the verandah as indicated in the layout..Install a top and finish with epoxy at the pass through box.

The specifications are as per the pass through box in first and second floor

Floors

Procedure and refurbishment to be as set out under the Main reception ‘floor’ section.

Walls

Procedure and refurbishment to be as set out under the main reception ‘wall’ section.

Ceiling

Procedure and refurbishment to be as set out under the main reception ‘ceiling’ section.

Doors

The main door is a single leaf opening with a three-sided frame and top lights over. The door leaf is complete with a viewing window to allow observation of space. The door is generally in good order. Inspect for any locking problems and make good as required.

Install access control.

Windows

The space has an aluminium frame window. Inspect for any locking problems and failure of seals between the frames and glazing panes. Repair any locking problems and completely replace the seals. Remove and set aside all glazing, clean and repair frames and re-fix glazing panels using a suitable seal.

Adjust the window and its opening to accommodate the pass through box.

Pass through box

Create a pass through box within the existing aluminium window as indicated in the layout..Install a top and finish with epoxy at the pass through box.

Epoxy finish work tops to extend from inside the room towards specimen receiving that can serve two at the same time

The specifications are as per the pass through box in first and second floor

Engineering services

Mechanical and plumbing works

Inspect the AC and other mechanical works , fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Design a solution and install data points and power outlets to serve the additional equipment as indicated in the Architectural layout. Install a CCTV camera with a clear view of the entire space , entrance, and pass through box. Design and Install lighting and general electrical system as required to serve the function. Install intercom for communication calls to coordinate for both HIV, Virology and Genomic labs[A] and TB Lab[B]

Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Miscellaneous

A 4ft BSC onto the wall to be used when unboxing of the samples(refer to Architectural plan)

Install LMIS system, Procure and install 4 shelved trolleys placeable under the Epoxy finish table top for sample transport from ground floor to the labs.

Introduce racks for consumables on the corner of the room for each lab which are lockable (gloves, masks), Install CCTV, and safety signages. Sink to have a sensor tap, electric sanitizer holder, paper towel dispenser and

Install a lab coat hanger on the wall near the door

Conference room

No action to be taken.

Head of NHRL:

No action to be taken.

Equipment and Calibration Management Room

No action to be taken

Toilets

No action to be taken.

BMS Office

Layout

Design and establish a control room for the CCTV surveillance system next to the HVAC control room partition (Aluminium Frame and glazing) the room into two to accommodate the CCTV control room by the building manager/ security). The larger, main room will be for CCTV control and the smaller, inner room will be for BMS/HVAC control. Install controlled access doors for both rooms. Install screens in the two rooms (72 inches), Install CCTV in the two rooms and LED lighting (refer to Architectural layout)

Floors

The BMS office has granito tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Procedure and refurbishment to be as set out under the conference room ‘floor’ section.

Walls

Procedure and refurbishment to be as set out under the conference room ‘walls’ section.

Ceiling

Procedure and refurbishment to be as set out under the conference room ‘ceiling’ section.

Doors

The main access doors are metallic and grilled.

Procedure and refurbishment to be as set out under the conference room ‘doors’ section.

Close out the exit door facing the verandas described in Verandah ‘door’ section

Windows
Procedure and refurbishment to be as set out under the conference room ‘windows’ section.

Engineering services
Mechanical and plumbing works
Procedure and refurbishment to be as set out under the conference room ‘mechanical and plumbing works’ section.

Electrical
Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Data entry room
No action to be taken.

Server room
Floor
The server room has granito tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Procedure and refurbishment to be as set out under the conference room ‘floor’ section.

Walls
Procedure and refurbishment to be as set out under the conference room ‘walls’ section.

Ceiling
Procedure and refurbishment to be as set out under the conference room ‘ceiling’ section.

Doors
Design and Install burglar proof grills and a metallic grill door on the outside swinging towards the corridor along the existing aluminium window and door. with controlled access.

Procedure and refurbishment to be as set out under the conference room ‘doors’ section.

Windows
Procedure and refurbishment to be as set out under the conference room ‘windows’ section.

Engineering services
Mechanical and plumbing works
Procedure and refurbishment to be as set out under the conference room ‘mechanical and plumbing works’ section.

Electrical
Install CCTV camera, and LED lighting. Install a high capacity UPS r that can hold the HVAC running in case of complete power failure.

Refurbishment of the light fittings,power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Lounge/dining

No action to be taken.

Kitchen

Floor

The kitchen has tiles flooring system (refer to architects plans for areas covered by the granito tiles flooring system)

Procedure and refurbishment to be as set out under the conference room ‘floor’ section.

Walls

Procedure and refurbishment to be as set out under the conference room ‘walls’ section.

Ceiling

Procedure and refurbishment to be as set out under the conference room ‘ceiling’ section.

Doors

Procedure and refurbishment to be as set out under the conference room ‘doors’ section.

Worktop and shelving

Inspect, identify the route cause, design a solution and repair the sinks, shelves and countertop as required.

Windows

Procedure and refurbishment to be as set out under the conference room ‘windows’ section.

Engineering services

Mechanical and plumbing works

Procedure and refurbishment to be as set out under the conference room ‘mechanical and plumbing works’ section.

Electrical

Refurbishment of the light fittings,power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Store

No action to be taken.

Training room

No action to be taken.

Terrace

No action to be taken.

Specimen receiving/Accessioning

No action to be taken.

Fire escape lobby, staircase and door

Procedure and refurbishment to be as set out in all sections of the ‘Fire escape lobby, staircase and door’ in second floor level.

Emergency doors to be labelled appropriately.

Hallway between grid 3 and 12

No action to be taken.

The Lift and main staircase lobby, exterior of lift core, stairwell walls, floor and ceiling

Procedure and refurbishment to be as set out in all sections of the 'The Lift and main staircase lobby, exterior of lift core, stairwell walls, floor and ceiling ' in second floor level.

Other areas

Ducts

Procedure and refurbishment to be as set out in the 'ducts' section in second floor level.

Fire extinguishers

Procedure and refurbishment to be as set out in the 'fire extinguisher' section in second floor level.

Fire hose reel

Procedure and refurbishment to be as set out in the 'fire hose reel' section in second floor level.

Third Floor

Covered terrace/staff break room

Layout

Design and partition (aluminium frame and glazing) into two areas, a meeting area for the NTRL staff with capacity to hold 25 pax,, and a dining/break area with capacity for 20 pax (in 5 tables)-.(Refer to Architectural layout)

Install a hand washing sink, and a paper towel holder within the dining/break area.

Floors

The entire area has ceramic tiles flooring system (refer to architects plans for areas covered by tiles flooring system)

Inspect for failure in any of the tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls

Inspect for any existing cracks and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Suggested options for crack repair, are as per the procedures in BSL2 crack repair work.

Roofing and insulation

Inspect for any damaged and stained insulation, roof leakage, roof cover quality and performance, all gutters and connection to downpipe, design and install a solution in case of any problem. The internal lay outing and other works should take place only after the root cause of the damage, leakages; roof replacement has been identified and remediated.

Doors
The door is generally in good order. Inspect for any locking problems and make good as required.

Windows
The space has aluminium frame windows. Inspect for any locking problems and failure of seals between the frames and glazing panes. Repair any locking problems and completely replace the seals. Remove and set aside all glazing, clean and repair frames and re-fix glazing panels using a suitable seal.

Engineering services
Mechanical and plumbing works
Inspect mechanical works, fittings and plumbing works connections within or adjacent to the space, for any problems or leakages, identify the root cause and repair as required.

Electrical
Design and Install within the meeting room power sockets, internet connection, and CCTV camera with clear view of the space and the entrance/exit.

Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Kitchen including wet and dry store

Floors
Procedure and refurbishment to be as set out under the Covered terrace/staff break room ‘floors’ section..

Walls
Procedure and refurbishment to be as set out under the Covered terrace/staff break room ‘walls’ section.

Roofing and insulation
Procedure and refurbishment to be as set out under the Covered terrace/staff break room ‘roofing and insulation’ section.

Doors
The doors are generally in good order. Inspect for any locking problems and make good as required.

Windows
Procedure and refurbishment to be as set out under the Covered terrace/staff break room ‘windows’ section.

Engineering services
Mechanical and plumbing works
Inspect mechanical works , fittings and plumbing works connections within or adjacent to the space, for any problems or leakages, identify the root cause and repair as required.

Electrical
Installation of LED Lighting, type G power sockets and stainless steel storage cabinets in wet store.

Installation of LED Lighting, type G power sockets and stainless steel storage cabinets in dry store.

Refurbishment of the light fittings,power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Toilets

Floor

The toilet space has ceramic tiles flooring and walling system (refer to architects plans for areas covered by the granito tiles flooring system)

Inspect for failure in any of the laid tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls

Procedure and refurbishment to be as set out for the floor tile repair work.

Ceilings

Procedure and refurbishment to be as set out under the covered terrace/break area ‘ceiling’ section.

Doors and entry points

All doors are made of timber with a three-sided timber frame. Inspect for any locking problems and make good as required.

Windows

The space has aluminium frame windows. Inspect for any locking problems and failure of seals between the frames and glazing panes. Repair any locking problems and completely replace the seals. Remove and set aside all glazing, clean and repair frames and re-fix glazing panels using a suitable seal.

Engineering services

Mechanical and plumbing works

Inspect for air circulation, adequacy in ventilation and other mechanical works , fittings and plumbing works connections within the space, for any functioning problems or leakages, identify the root cause, design and propose a solution for approved air quality within the toilets and repair as required.Install elbow operated/sensor taps in the toilets. in both Gents and ladies toilets.

Electrical

Refurbishment of the light fittings and general electrical work is specified in detail in the Electrical specification document. inspect and identify causes of failure of electrical fittings and repair as required.

Open terrace ‘A’ and ‘E’

Floors

Inspect for failure of the drainage system and identify the root cause. Design a solution to rectify the problem to facilitate a permanent solution which eliminates all risk of future failure.Design and install an efficient floor finish of artificial grass carpet to accommodate outdoor seaters and patio umbrellas.(refer to Architectural plan)

Walls

Inspect for any existing cracks and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any

existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Doors

The access door to the terrace is generally in good order. Inspect for any locking problems and make good as required.

Engineering services

Mechanical and plumbing works

Inspect mechanical works , fittings and plumbing works connections within or adjacent to the space, for any problems or leakages, identify the root cause and repair as required.

Electrical

Install CCTV with a clear view of the space and replace light bulbs with LED lighting for security.

Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Open terrace 'B'

Floors

Inspect for failure of the drainage system and identify the root cause. Design a solution to rectify the problem to facilitate a permanent solution which eliminates all risk of future failure.Design and install an efficient floor finish of artificial grass carpet to accommodate outdoor seaters and patio umbrellas.(refer to Architectural plan)

Walls

Inspect for any existing cracks and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Design and install efficient grill work on the dwarf/parapet walls.

Doors

Introduce an access controlled grill door to this terrace.

Roofing

Design a solution and install an efficient roof cover in this terrace, to effectively connect to the existing /rectified roofing. Considerations to be made on AHU's and other fittings to be placed on the terrace

Existing AHU's and fittings on terrace

Carefully inspect, identify and remove the installations on the terrace/wall before refurbishment. Faulty installations to be cart away.Working installations to be refixed after floor, wall and roof refurbishment.

Engineering services

Mechanical and plumbing works

Inspect mechanical works, fittings and plumbing works connections within or adjacent to the space, for any problems or leakages, identify the root cause and repair as required.

Electrical

Install CCTV with a clear view of the space and replace light bulbs with LED lighting for security.

Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Open terrace 'C'

Layout

Design and partition the space to achieve a walkway connecting covered terrace/break area door, plant room door, proposed cargo lift lobby, and an open space to be utilized as a fitness/gym space.(Refer to Architectural plan)

The fitness space should have changing areas for each gender.

Equipment in the fitness room include treadmills,

Design a solution and install an efficient partition material and floor finish to serve the walkway and fitness/gym purpose.

Floors

Inspect for failure of the drainage system and identify the root cause. Design a solution to rectify the problem to facilitate a permanent solution which eliminates all risk of future failure.Design and install an efficient.

Design a solution and install an efficient floor finish to serve the walkway and fitness/gym purpose.

Walls

Inspect for any existing cracks and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Design a solution and install an efficient partition material.Design and install aluminium windows on the existing dwarf walls. Carefully remove part of the dwarf wall, design and install a door for access from cargo lift. (refer to Architectural plan)

Doors

Design and install efficient doors for access from cargo lift, to access the fitness room(refer to Architectural plan)

The access doors to the terrace from the staircase and break area are generally in good order. Inspect for any locking problems and make good as required.

Roofing

Design a solution and install an efficient roof cover in this terrace, to effectively connect to the existing /rectified roofing. Considerations to be made on drainage and gutters.

Engineering services

Mechanical and plumbing works

Inspect mechanical works, fittings and plumbing works connections within or adjacent to the space, for any problems or leakages, identify the root cause and repair as required.

Electrical

Design a solution and Install CCTV with a clear view of the spaces and the general electrical works required for the space to be functional.

Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Open terrace 'D'

Floors

Inspect for failure of the drainage system and identify the root cause. Design a solution to rectify the problem to facilitate a permanent solution which eliminates all risk of future failure.The floor finish should be waterproof and easy to clean.

Walls

Inspect for any existing cracks and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Doors

The access door to the terrace is generally in good order. Inspect for any locking problems and make good as required.

Engineering services

Mechanical and plumbing works

Inspect mechanical works , fittings and plumbing works connections within or adjacent to the space, for any problems or leakages, identify the root cause and repair as required.

Electrical

Install CCTV with a clear view of the space and replace light bulbs with LED lighting for security.

Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Biosafety room

Layout

Convert the space to be a staff resting/emergency room to accommodate Furniture:

.(refer to Architectural plan)

Floors

The library/resource room has tiles flooring system (refer to architects plans for areas covered by the tiles flooring system)

Inspect for failure in some of the tiles and identify the root cause. Design a solution to remove, cart away and replace the loose tiles with tiles of same specification, size and colour as required, to facilitate a permanent solution which eliminates all risk of future failure.

Walls

Inspect for any existing cracks and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Suggested options for crack repair, are as per the procedures in BSL2 crack repair work.

Ceiling

The area is fitted with an ‘acoustic ceiling’ which is generally in good order. Inspect for any damaged and stained tiles and replace. The tile replacement should take place only after the root cause of the damage and/or staining has been identified and remediated. In addition inspect for any damaged supporting frame remediate and make good as needed.

Refurbishment of the light fittings, fire detection and alarm systems, comfort cooling ceiling cassette is specified in detail in the relevant section or specification.Inspect and ensure that systems function as required.

Doors

The door is generally in good order. Inspect for any locking problems and make good as required.

Windows

The space has aluminium frame windows. Inspect for any locking problems and failure of seals between the frames and glazing panes. Repair any locking problems and completely replace the seals. Remove and set aside all glazing, clean and repair frames and re-fix glazing panels using a suitable seal.

Install efficient window blinders.

Engineering services

Mechanical and plumbing works

Inspect the AC and other mechanical works , fittings and plumbing works connections within or adjacent to the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Install type G power sockets and Internet ports.

Refurbishment of the light fittings,power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Meeting room

Floors

Procedure and refurbishment to be as set out under the library/resource room ‘floors’ section.

Walls

Procedure and refurbishment to be as set out under the library/resource room ‘walls’ section.

Ceiling

Procedure and refurbishment to be as set out under the library/resource room ‘ceiling’ section.

Doors

The doors are generally in good order. Inspect for any locking problems and make good as required.

Install access control to the door.

Windows
The space has aluminium frame windows. Inspect for any locking problems and failure of seals between the frames and glazing panes. Repair any locking problems and completely replace the seals. Remove and set aside all glazing, clean and repair frames and re-fix glazing panels using a suitable seal.

Engineering services
Mechanical and plumbing works
Procedure and refurbishment to be as set out under the library/resource room ‘mechanical and plumbing works’ section.

Electrical
Refurbishment of the light fittings,power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Plant room
Floors
Inspect for failure of the drainage system and identify the root cause. Design a solution to rectify the problem to facilitate a permanent solution which eliminates all risk of future failure.The floor finish should be easy to clean.

Walls
The other procedure and refurbishment to be as set out under the library/resource room ‘walls’ section.

Inspect the existing vents on performance and possibilities allowing water seepage, identify the problems if any and design a solution.

Roofing and insulation
Procedure and refurbishment to be as set out under the ‘covered terrace/break area’ roofing and ceiling section.

Doors
The doors is generally in good order. Inspect for any locking problems and make good as required.

The doors to be double door and with access control.

Engineering services
Mechanical and plumbing works
Ensure HVAC is functionally integrated for both labs[TB and virology lab] Secure the chillers by Designing a solution and installing grills and an access control grill door same width size as the main entrance door.

Procedure and refurbishment to be as set out under the library/resource room ‘mechanical and plumbing works’ section.

Electrical
Design and install LED security lights and CCTV cameras to cover the entire space including access points.

Refurbishment of the light fittings,power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Fire escape Staircase lobby and door

Procedure and refurbishment to be as set out in all sections of the 'Fire escape lobby, staircase and door' in second floor level.

Emergency doors to be labelled appropriately.

The Lift and main staircase lobby, exterior of lift core,stairwell walls, floor and ceiling

Procedure and refurbishment to be as set out in all sections of the 'The Lift and main staircase lobby, exterior of lift core,stairwell walls, floor and ceiling ' in second floor level.

Other areas

Fire extinguishers

Procedure and refurbishment to be as set out in the 'fire extinguisher' section in second floor level.

Fire hose reel

Procedure and refurbishment to be as set out in the 'fire hose reel' section in second floor level.

Roof tank terrace on top of staircases and lift core

Floors

Inspect for failure of the drainage system and identify the root cause. Design a solution to rectify the problem to facilitate a permanent solution which eliminates all risk of future failure.The floor finish should be waterproof and easy to clean.

Walls

Inspect for any existing cracks and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Engineering services

Mechanical and plumbing works

Inspect mechanical works , fittings and plumbing works connections within or adjacent to the space, for any problems or leakages, identify the root cause and repair as required.Inspect the entire Water storage systems and tanks,water reticulation system, identify the problems of poor supply to some spaces like toilets, and the route cause.Design and install a solution to rectify the problems.

Possible solution:Designing and installing an automated pumping mechanism, and overflow management and efficient drainage.

Electrical

Install CCTV with a clear view of the space and replace light bulbs with LED lighting for security. Install CCTV and enhance all the doors leading tank space access areas to be access controlled.

Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Roof Level:

Existing roofs

Inspect for any damaged roof cover, roof leakage, roof cover quality and performance, all gutters and rainwater goods, design and install a solution for an effective and efficient system of roofing, rainwater goods, gutters and downpipes.

Basement Level:

Basement water tank

The access door to tank space to be access controlled. Inspect and identify problems related to the installed pump, quantity gauge and floater. Possible solution is to repair the pump for the tank, replace the water quantity gauge and floater. Design and install CCTV camera and Install LED light fitting.

Waste treatment plant

Layout

To be converted to a store for NTRL after waste treatment plant removal.

Floors

Inspect, identify the cause of dilapidation, storm water effect, design a solution and repair to avoid any future floor problem.

Walls

Inspect for any existing cracks and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Suggested options for crack repair, are as per the procedures in BSL2 crack repair work.

Ceiling

The ceiling at the waste treatment plant is plastered and painted slab soffit.It is generally in good order. Inspect for any leakage effects, or effects as a result of work on the wall as per the procedure in the ‘walls’ above.Identify the root cause and design a solution and install as required.

Doors

The access door to be access controlled.

Engineering services

Mechanical and plumbing works

Remove the waste treatment plant and dispose off. Connections to the waste treatment plant to be removed The existing effluent drainage pipework towards the waste treatment plant to be inspected from the source for any problems and leakages.,inspect and identify route cause and design an alternative waste drainage from laboratory or maintain and renovate the existing line making good of all the defects.

Inspect the AC and other mechanical works , fittings and plumbing works connections within or adjacent to the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Design and install CCTV camera and access control for the door.Design and Install LED light fitting.

Refurbishment of the light fittings,power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

NTRL store

Floors

Inspect, identify the cause of dilapidation, storm water effect, design a solution and repair to avoid any future floor problem.

Walls

Inspect for any existing cracks and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair.

Suggested options for crack repair, are as per the procedures in BSL2 crack repair work.

Ceiling

The ceiling at the waste treatment plant is plastered and painted slab soffit.It is generally in good order. Inspect for any leakage effects, or effects as a result of work on the wall as per the procedure in the ‘walls’ above. Identify the root cause and design a solution and install as required.

Doors

Change the door to a metallic one and install access control.

Windows

The space has aluminium frame windows. Inspect for any locking problems and failure of seals between the frames and glazing panes. Repair any locking problems and completely replace the seals. Remove and set aside all glazing, clean and repair frames and re-fix glazing panels using a suitable seal.

Engineering services

Mechanical and plumbing works

Inspect the AC and other mechanical works , fittings and plumbing works connections within or adjacent to the space, for any functioning problems or leakages, identify the root cause and repair as required.

Electrical

Design and install CCTV camera and access control for the door.Design and Install adequate light fitting.

Inspect, identify, design and install fire alarm systems.

Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, is specified in detail in the Electrical specification document.

Other fittings

Procure and Install racks for archival and storage of documents(specifications provided in the relevant section).The racks should be of stainless steel, rust-proof, low temperature resistant, wear resistant and corrosion resistant as well as adjustable to customized sizes.

NHRL/Virology Store

No action to be taken.

NTRL Store' 2'

No action to be taken.

Cleaner's room:

No action to be taken.

Specimen archiving room

No action to be taken.

Cold room 1 and 2 lobby:

Doors

Design and install a double swing grill door with access control restricting access to the two cold rooms. The door should be made of stainless steel.

Fittings and Equipment

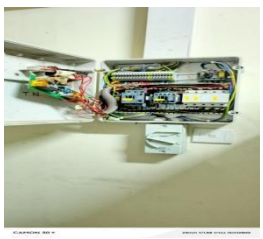
Repair the Biosafety cabinet BSC 1300 series and replace the sash door.[front glass]

Cold room 1: HVRL

No action to be taken

Cold room 2: NTRL

The switch is faulty and needs to be replaced. Control panel not working optimally. Service the NTRL cold room and replace the control panel. Install a data logger and upgrade the switch to a 3-phase. Inspect and Install adequate lighting for the cold room.



Procure and Install racks (specifications provided in the relevant section).The racks should be of stainless steel, rust-proof, low temperature resistant, wear resistant and corrosion resistant as well as adjustable to customized sizes.

Sample of the storing racks:

Issuing Office

No action to be taken

Freezer room

No action to be taken

Electrical plant and equipment:

a) Fuel store:

Currently used as the fuel store, the use remains as it is.

No action to be taken

b) Generator room

The generator room is prone to overheating and the exhaust vent is inadequate to regulate this. To mitigate the proposed actions are to design and construct a semi-open generator room at the front right corner of the compound with controlled access. It will have a shade constructed with 28 gauge corrugated iron sheets, surrounded with a heavy gauge security grill and access control door. There should be LED lighting and CCTV around it.

The current generator room is to be renovated as set out under the NTRL store procedure and renovation works and act as storage for the generator. Design and install grills and access controlled door within the lobby accessing the switch room. Install CCTV manning fuel store, switch room access and main entrance. (Refer to Architectural plan).

c) Switch room:

No action to be taken

d) Generator room, switch room and Fuel store lobby

Design and install a grill and double swing grill door with access control restricting access to the switch room. There should be LED lighting and CCTV manning the entrance.

No action to be taken in other elements

Parking space

Floors

Inspect, identify the cause and repair any damaged paving slabs.

Assess and repair the area around the stores/specimen archiving access door to eliminate storm water drainage problems to the store's verandah via the main door.

Walls
No action to be taken.

Ceiling
The ceiling at the waste treatment plant is plastered and painted slab soffit.It is generally in good order. Inspect for any leakage effects, or effects as a result of work on the wall as per the procedure in the ‘walls’ above. Identify the root cause and design a solution and install as required.

Vehicular Access to parking space
The access area has a drainage channel with metal grating on top. Assess and design a solution for storm water problems and drainage maintenance procedures.

Engineering services
Mechanical and plumbing works
Inspect the mechanical works , fittings and plumbing pipe works connections within or adjacent to the space, for any functioning problems or leakages, identify the root cause and repair as required. Assess, identify sprinklers performance or root cause of failure and rectify as required.

Electrical

Design and install CCTV cameras and install water proof lighting. Add electric car charging sockets as per the parking spaces.

Refurbishment of the light fittings, power outlets, general electrical work, fire detection and alarm systems, as specified in detail in the Electrical specification document.

Fire escape Staircase lobby and door
Procedure and refurbishment to be as set out in all sections of the ‘Fire escape lobby, staircase and door’ in second floor level.

Emergency doors to be labelled appropriately.

The Lift and main staircase lobby, exterior of lift core, stairwell walls, floor and ceiling
Procedure and refurbishment to be as set out in all sections of the ‘The Lift and main staircase lobby, exterior of lift core, stairwell walls, floor and ceiling ’ in second floor level.

Emergency doors to be labelled appropriately.

Other areas
Sprinkler system
Inspect the existing system for functionality, connections and any problems, identify the root cause and repair as required.

Fire extinguishers
Procedure and refurbishment to be as set out in the ‘fire extinguisher’ section in second floor level.

Fire hose reel
Procedure and refurbishment to be as set out in the ‘fire hose reel’ section in second floor level.

Equipment/cargo lift

The cargo lift is for the purpose of carrying heavy machine to the upper floors of the building, currently the building has an elevator that cannot perform the function of a cargo lift. The laboratory requires an elevator from the outside of the building (installed on the external walling) as per the indication on the drawings. The lift should have all warning signs. Assess the equipment needs of the facility, the sizes, weight and configuration, floor to floor heights, space requirement and design, and Install an efficient equipment/cargo lift either to be as per the below components, or as otherwise proposed by your design solution.

Main components of LG cargo lift.

Cross Beam: to make sure lead rails are stable and firm.
Lead Rails: the moving guild railings for the platform table.
Leaf Chains: to lift up the platform table.
Hoisting Frame: the mechanism fixed with cylinders, moving along lead rails.

Hydraulic Cylinder: stretch out and drawback, so hoisting frame and chains move together.
Swing Gate & Railings: safety protections for cargo on platform.
Platform Table: to transfer cargo up and down between floors.

Loading CAPACITY	The weight and volume of each load task is 1 Tone
PLATFORM SIZE W*D	2,000 x 2,000mm
LIFTING HEIGHT	The distance cargo lift goes up is 19m
PIT W*L*D	outer size of the whole lift 2650x2160x300mm.
MOTOR POWER	4KV
POWER SUPPLY V	220/240/380/415

The lift should be installed from basement level, able to access ground, first, second and third floor levels. (refer to Architectural plans for actual location and determine floor to floor heights and levels on the existing building).Maintenance aspects should be factored in the installation.

Incinerator Building

No action to be taken

External works:

Entrance and signages

At the main gate design and install signage with “NPHL Block B NTRL and NHRL reference laboratories”

Provide signage on NPHL Block B front wall to outline the laboratories hosted under that block namely:

- First floor: National HIV Reference Laboratory, Virology Lab and Genomics Lab
- Second floor: National TB Reference Laboratory

Pavement round the build, drainage channels and external ground area.

Inspect for any existing cracked/broken or loose pavement around the building, slope of the pavement from the building walls, efficiency of existing drainage channels, any blocked channels, stormwater flow and identify the root cause. Repair, or propose and install a solution for external pavement and drainage channels that is durable is to be maintained.

Inspect both soft and hard ground around the building for any service lines, label appropriately, measure, design and install pavement blocks(80mm thick) the same design as the installed paving blocks at the front of the building.

The required procedure must be followed in laying the paving blocks.

Special consideration on gradient/slope, for water to flow towards existing or newly created drainage channels. Any beautification as an installation of flowers should be considered.

Walls (including the equipment access doors/outlets) and lift

Diagnose the cause for water damage and propose remedial action. Replace all the rain-water drainage pipes and correct the outlets to ensure it drains to the ground and not the concrete slabs.

Inspect for any existing cracks and identify the root cause. Identify the underlying cracking mechanism(s) in the structure, sub-structure and substrates and design a solution to remediate any existing cracks and prevent or control any future movement. Remediate the existing paint finish and any other affected elements during crack repair, or propose a solution for external wall finish that is durable and easy to maintain.

Engineering services

Mechanical and plumbing works

Inspect all outdoor units, mechanical appliances, connections, fittings, pipeworks, and plumbing works connections, for any functionality problems, poor positioning, leakages, blockages, poor and loose connections,poor clipping to the walls, alignment, broken pipeworks, leakages, adequacy in pipework sizes, the adequacy in outlet number, and identify the root cause any of the problems and repair as required. provide secure casing for all cables/pipe works running on the building's external wall. All mechanical and plumbing connections should be safely secured on the building's external wall. All downpipes should have shoe bends installed and water directed to existing drainage channels.

Design and install clear Labels to indicate all underground water supply and drainage routes/pathways appropriately.

Electrical works

Design and install flood lights with photo sensors all around the building in addition to replacing the current manual security lights. Install security lights with motion sensors along the perimeter fence. Install five (5) behind the building, three (3) on the wall facing the National Blood Transfusion Services building, three at the wall facing the Incinerator or the space facing where the containers are placed with the old cars, and towards the compressor/incinerator sides. Install six at the front of the building to adequately secure and light the area for security purposes. The bulbs should be both manual lighted and photo sensors on the walls. Design and install secure casing for all cables running

on the building's external wall. Design and install clear Labels to indicate all underground live electric cable routes/pathways appropriately.

Install CCTV on the building walls and entrances/exits, external perimeter walls/grills, main access gates, and security gates to back of the building that are multi-directional.

Perimeter wall

Inspect, cut down or trim the 7 trees near the perimeter wall at the back of the building and one at the front of the building and design a solution to raise the existing perimeter wall at the back of the building by an additional 1200mm. The entire existing perimeter wall between the incinerator and block 'B' running along the KEMRI wall behind the NTP stores ', and the existing retaining dwarf wall between 'blood transfusion' and Block 'B' should be raised to a height corresponding to the raised back of the building perimeter wall.

Design and install security grills including a security grill gate as described in the gates section.

Design and install adequate wall copings, razor wire and electric fence in the entire perimeter installation to enhance security.

Security grill barriers, gates and doors.

Design and install metallic grills of adequate metal sizes and access controlled gates on the two sides of the building to restrict access to the back. (refer to Architectural plan).The two access controlled doors will be 1800mm wide and a height of 2400mm.The grills height to correspond to the installed new perimeter height.Design and install razor wire and electric fence on the grills.

Design and install two metallic security grill gates(4200mm wide) including all the accessories to secure the entire NPHLS compund as indicated in the Architectural layout.Replace the existing gate that accesses the incinerator with the one of the designed grill gates.

Design and install metallic security grill and access controlled door to secure the outdoor units at the back of the building. The grills will be 3,000mm.high.(refer to Architectural plan)

Space usage in front of NPHLS building

Relocate two existing storage containers at the front of the NPHLS building and design and install a generator house as described in generator room section (refer to Architectural plan)

External Fire fighting water storage tank

Inspect for efficiency in supply of water to hose reels, identify any problems and repair as required.

External – Fire Fighting Equipment:

Inspect and test for performance and adequacy of the existing hose reels, identify any problems and repair as required. Design and Install additional 4 no. fire hose pipes with specifications as the existing or as proposed based on the inspection, on the external wall of the building and secure them.

Access, service, and secure all the external fire fighting equipment. Ensure safety signages are installed to mark or identify the spots.

Systems affecting all floors/many areas:

The systems include Electrical, Mechanical, plumbing and drainage works.

Electrical works

Scope of work

The scope of the electrical works comprises of the following:

- Building Management System (BSM) for monitoring and controlling the HAVC system ;
- CCTV System (refer to specified areas)
- Access control (refer to specified areas)
- Electrical Power supply and distribution
- Power back up
- Fire alarm system (refer to specified areas)
- Access control system
- Intercom (refer to specified areas)

In addition to the above scope, clearly document the operation and maintenance manual for electrical works and record drawings (as installed/built) for all electrical works.
All electrical devices shall have a warranty.

Building management system (BMS)

The work should involve assessing the existing BMS and designing a solution to have a functional BMS system.

The proposed new BMS system shall monitor and control the HAVC and the electrical devices in both BSL3 labs on the first and second floors.

The major components of the BMS system shall include but not limited to the following: The management Software and License for BMS: The license shall be a lifetime license.

A Direct Digital Controller (DDC) panel enclosure containing all the wiring, Power Supply Unit, Relay modules, terminals, and any other necessary accessories.

Control station: shall have a minimum of 1 TB HDD, 32GM RAM, NVDIA graphics 27 inch Monitor Computer,.

DDC Controller: - Modular Automation station with BACnet/IP and web server, Digital Input/Output module for connecting the input and output device

CCTV system

The works shall involve assessing and retaining some components or removing the existing CCTV system and installing a new one in the specified areas above. The major components of the system shall include but not be limited to the following; IP CCTV Camera, patch panel, Data Switch, NVR, and display screen.

IP CCTV Camera: All CCTV cameras shall be IP-based, high-quality imaging, high resolution, clear imaging against strong backlight, PoE capability, and Motion detection (human classification).

NVR: The NVR shall be embedded with management software and licence, Intelligent analytics based on deep learning algorithm, support multi brand network cameras, support IP search feature to

automatically discover the network cameras, Event-triggered recording, Built-in Server for Recording and Playback, Allows simultaneous display of Video Channels.

Data switches: The data switch should be rack-mounted and shall be housed in the existing data cabinet. The switch shall be capable of powering all the CCTV cameras through PoE Ports.

Switch ports should be Power over Ethernet (PoE) enabled, EEE Compliant. RJ-45 Ports should Gigabit Ethernet Ports (RJ45 + Small form-factor pluggable [SFP]).

Display Screen: The screen shall be 75 inches LED to display all images from CCTV camera.

Power supply and distribution

New power points and lighting points shall be installed at the BSL3 laboratories and shall meet the requirements of a biocontainment laboratory.

New power points shall be installed at BSL2 to enhance the phase balance.

Power Outlet Points shall be wired in Single core PVC insulated CU cables drawn in HG PVC conduits concealed in building fabric. The cable colour code shall be as per British standard (BS).

Assess, identify the problems and the root cause and design a solution to either Upgrade (bigger size of cable) of Sub main cables from the LV board to the (two number)2no. distribution boards in each floor, or as deemed required. The cable shall be as per British standard (BS). The cable colour code shall be red for red phase, blue for blue phase and yellow for yellow phase and black for neutral conductors.

All underground cables shall be SWA Armoured Cable.

All cables shall be protected using the appropriate circuit breakers.

The power supply cable to the respective HVAC equipment for the (two number) 2No. BSL3 labs in first and second floor shall be based on the rating of the equipment;

Assess, identify problems and root cause and either upgrade the existing distribution board to 8 ways complete with 125 AMPS isolator on both the first and second floors where the labs are located, and design a solution deemed required.

Power supply

Assess and design a solution to Install a new 45 kVA 3-phase Automatic Voltage stabilizer (AVS) to serve the HVAC mechanical equipment or, as required. The voltage of the grid power supply keeps fluctuating; therefore, there is a need to protect the electrical device by AVS.

Assess and design a solution to install a new 200 kVAR 3-phase power factor correction capacitor bank to serve the whole laboratory block or as deemed required.

Assess and design a solution to install a new 20kVA Double conversion online UPS for cleaning power for BMS system at control room or as deemed required.

Upgrading of the Low Voltage (LV) board: There is no provision for connecting additional load. Therefore the need to install a new Main LV Board. It should be Metal clad, floor mounting Free standing, compartmentalized Main LV Board with appropriate Tripple Pole Neutral (TPN) Bus Bars fully wired for 1No. appropriate Adjustable incomer TPN MCCB Cable chamber,3 phase capacitor bank phase chamber, indicator lamps, selector switches, Current Transformers (CTs) and metering chamber able to accommodate 1No., 1 No KPLC Three Phase Meter and a Three Phase cut-out The board shall be powder-coated with a degree of protection IP65, Form 4b, RAL 7035 and suitable for indoor installation, front access, compliant with standards IEC 60974-2c. Modular type fabricated from steel frames and sheet steel 14swg including testing, provision labelling the board complete with all fixing materials and accessories. The board should have appropriate number of spares

Fire alarm system

Refer to specified areas. The works will involve assessing and either retaining some components or removal of the existing fire alarm system and installation of a new one.

This will consist of, but not limited to the following: Fire alarm panel, break glass, sounders and smoke detectors. The entire fire alarm device shall be addressable. The sounder shall have red Flashing beacon. Fire alarm system shall be wired with heat resistant screened cables. The smoke detector shall be Photoelectric.

Access control

The works will involve assessing and removing the existing access control and installing a new system, or introducing new system to specified areas in this URS. The access control system shall consist of but not limited to the following: Access control module, IP based door Fingerprint biometric, pin & proximity card reader, Door Exit switch, Override Key switch, Emergency Break glass; Desk mounted Fingerprint Authentication Scanner, Smartcard Reader/Writer and Cards. The reader shall be LFD (Live Fingerprint Detection) enabled with Ingress Protection of IP67. The access control reader for BSL3 shall be Face Recognition.

Intercom system

The system shall provide secure communication between the internal sections of the laboratory (refer to the specified areas in this URS).

Plumbing and drainage

Inspect existing mechanical works: including but not limited to AC's, duct works, outdoor units, plumbing works: including but not limited to water supply pipeworks, drainage pipeworks, gutters, Storage tanks and fittings, identify the problems including leakages, the root cause, and design a solution to repair with a guarantee of the problems not recurring in future.
All affected concrete work, ceiling, walling, plasterwork and painting should be made good.
In addition to the above scope, clearly document and record drawings (as installed/built) for all Mechanical, plumbing and drainage works.

Annexes:

Annex 1: Electrical Installation Works Specifications

SCOPE OF WORKS

The scope of the electrical works comprises of the following:

- Building Management System (BSM) for monitoring and controlling the HAVC system ;
- CCTV System for the entire block;
- Access control at the lab doors, main corridor doors, control rooms, and server room ;
- Intercom for BSL 3 LAB ;
- Electrical power supply and distribution for both BSL 3 and BSL 2;
- Prime-rated standby diesel Generator and auxiliary fuel tank;
- Transformer dedicated to the facility
- Overhauling and addition of power points for BSL 2
- Fire alarm system for the entire block
- Operation and maintenance manual for electrical works
- Records Drawings (As Installed) for all electrical works
- All electrical devices shall have a warranty

1.0 BUILDING MANAGEMENT SYSTEM (BMS)

The work should involve the removal of the existing BMS and installation of a new BMS system.

The proposed new BMS system shall monitor and control the HAVC and the electrical devices in both BSL3 labs on the first and second floors.

The major components of the BMS system shall include but not limited to the following:

a) The management Software and License for BMS: The license shall be a lifetime license.

b) A Direct Digital Controller (DDC) panel enclosure containing all the wiring, Power Supply Unit, Relay modules, terminals, and any other necessary accessories.

c) Control station: shall have a minimum of 1 TB HDD, 32GM RAM, NVDIA graphics 27 inch Monitor Computer

d) DDC Controller: - Modular Automation station with BACnet/IP and web server

e) Digital Input/Output module for connecting the input and output device

2.0 CCTV SYSTEM

The works shall involve removing the existing CCTV system and installing a new one in the whole facility. The major components of the system shall include but not be limited to the following; IP CCTV Camera, patch panel, Data Switch, NVR, and display screen. The CCTV cameras shall be installed in the server room, control room, BSL 3, along the corridors, public rooms, parking, backside of the lab and any other place that the user might propose.

IP CCTV C**amera:** All CCTV cameras shall be IP-based, high-quality imaging, high resolution, clear imaging against strong backlight, PoE capability, and Motion detection (human classification).

NVR: The NVR shall be embedded with management software and licence, Intelligent analytics based on deep learning algorithm, support multi brand network cameras, support IP search feature to

automatically discover the network cameras, Event-triggered recording, Built-in Server for Recording and Playback, Allows simultaneous display of Video Channels.

Data switches: The data switch should be rack-mounted and shall be housed in the existing data cabinet. The switch shall be capable of powering all the CCTV cameras through PoE Ports.
Switch ports should be Power over Ethernet (PoE) enabled, EEE Compliant. RJ-45 Ports should Gigabit Ethernet Ports (RJ45 + Small form-factor pluggable [SFP]).

Display Screen: The screen shall be 75 inches LED to display all images from CCTV camera.

3.0 POWER SUPPLY AND BACK UP

Power supply and distribution:

New power points and lighting points shall be installed at the BSL3 laboratories and shall meet the requirements of a biocontainment laboratory.

New power points shall be installed at BSL2 to enhance the phase balance.

Power Outlet Points shall be wired in Single core PVC insulated CU cables drawn in HG PVC conduits concealed in building fabric. The cable colour code shall be as per British standard (BS).

Upgrade (bigger size of cable) of Sub main cables from the LV board to the (two number)2no. distribution boards in each floor. The cable shall be as per British standard (BS). The cable colour code shall be red for red phase, blue for blue phase and yellow for yellow phase and black for neutral conductors.

All underground cables shall be SWA Armoured Cable.

All cables shall be protected using the appropriate circuit breakers.

The power supply cable to the respective HVAC equipment for the (two number) 2No. BSL3 labs in first and second floor shall be based on the rating of the equipment;

Upgrading of the existing distribution board to 8 ways complete with 125 AMPS isolator on both the first and second floors where the labs are located;

Power supply

a) Installation of a new 45 kVA 3-phase Automatic Voltage stabilizer (AVS) to serve the HVAC mechanical equipment. The voltage of the grid power supply keeps fluctuating; therefore, there is a need to protect the electrical device by AVS.

b) Installation of a new 200 kVAR 3-phase power factor correction capacitor bank to serve the whole lab block.

c) Installation of new 20kVA Double conversion online UPS for cleaning power for BMS system at control room.

d) Upgrading of the Low Voltage (LV) board: There is no provision for connecting additional load. Therefore the need to install a new Main LV Board. It should be Metal clad, floor

mounting Free standing, compartmentalized Main LV Board with appropriate Tripple Pole Neutral (TPN) Bus Bars fully wired for 1No. appropriate Adjustable incomer TPN MCCB Cable chamber,3 phase capacitor bank phase chamber, indicator lamps, selector switches, Current Transformers (CTs) and metering chamber able to accommodate 1No., 1 No KPLC Three Phase Meter and a Three Phase cut-out The board shall be powder-coated with a degree of protection IP65, Form 4b, RAL 7035 and suitable for indoor installation, front access, compliant with standards IEC 60974-2c. Modular type fabricated from steel frames and sheet steel 14swg including testing, provision labelling the board complete with all fixing materials and accessories. The board should have appropriate number of spares

Power Backup

There is a need for a secondary power back for the BMS and control room. A secondary power supply will ensure continuity of power to the control and BMS room in the event of power failure from the grid and generator. The system shall comprise but not limited to the following:

a) **Rechargeable Batteries:**

The batteries bank should be used specifically to support the BMS, server control room in the event the grid and generator power is off.
The batteries bank capacity should be able to support load for at least 8 hours at full load. The batteries shall be lithium ion

b) **Inverter Charger:**

The inverter / charger should be capable of charging the batteries to full capacity when the grid is available and seamlessly inverting the DC energy in batteries to AC load when the grid is off. Should not have break functionality in the event of grid failure.

4.0 FIRE ALARM SYSTEM

The works will involve removal of the existing fire alarm system and installation of a new one.

This will consist of and but not limited to the following: Fire alarm panel, break glass, sounders and smoke detectors.

The entire fire alarm device shall be addressable.

The sounder shall have red Flashing beacon

Fire alarm system shall be wired with heat resistant screened cables

The smoke detector shall be Photoelectric.

5.0 ACCESS CONTROL

The works will involve removing the existing access control and installing a new system for the BSL2 and 3 laboratories and at the main entrance to Block B. The access control shall be installed at the main door to Block B, the main doors to the labs, all lab doors, server room, control room, BMS room and the plant room. The BSL2 access control system shall consist of but not limited to the following: Access control module, IP based door Fingerprint biometric, pin & proximity card reader, Door Exit switch, Override Key switch, Emergency Break glass; Desk mounted Fingerprint Authentication Scanner, Smartcard Reader/Writer and Cards. The reader shall be LFD (Live Fingerprint Detection) enabled with Ingress Protection of IP67. The access control reader for BSL3 shall be Face Recognition.

Intercom system: the system shall provide secure communication between the internal sections of the laboratory. The lab personnel in the BSL 2 can easily communicate to the personnel inside the BSL 3 without getting inside the lab. This does not necessarily need to be connected to the public telephone system.

Annex 2: Mechanical Specifications

SPECIFICATIONS

A. HVAC SYSTEM

1.0 AIR HANDLING UNITS

1.1. **Existing AHU Details:**

Location: NPHL, BLOCK B, Roof top,

Type: 39HQ 08.06,

Manufacturer: Alarko

Carrier,

Country of Origin:

Turkey,

Year of Manufacture:

2014,

Volume Flow Rate: 7524

m3/h,

Total Static Pressure: 719

Pa,

External Dimensions: 1378 mm(W) x 1058mm (H)

Quantity: 2No.

Condition: Copper coils of the two remote condensing units were vandalised. . The AHUs have low running hours because they have not been used for most of the time since their installation. They were manufactured and installed around 10 years ago. Total replacement of the two AHUs is strongly recommended.

1.2. **Replacement of the Air Handling Units (AHUs)**

Install two **heat pump chillers** running on R410A refrigerant and capable of 65 kW cooling capacity. The 65kW Heat Pump Chiller will supply chilled water via a circulation pump to an insulated buffer tank. The buffer tank will supply water to the coil of the AHU via circulation and pressure pump and a 3-way valve. The system will also be equipped with a make-up tank and pump. All chilled water piping to be insulated to conserve energy. Chillers are supplied to act as redundancy to each other which includes all required pipe work with insulation, brackets and sensors / gauges, strainers.

All chilled water piping shall be insulated and vapour sealed to conserve energy. The two chillers shall be supplied to act as redundancy to each other.

Note: the Chillers sizing shall be based on one AHU capacity. In the event of one chiller failing the other chiller will be able to supply approximately 50 % of the required cooling capacity of 65 kW. This should be implemented in the BMS control software in the facility.

Install chilled water pumps for the chillers consisting of 2 circulation pumps and one booster pump. Include water filtration system and dosing system. Note a water supply point will be required on the roof.

Install two new 65 kW air handling units to replace the existing ones. The AHUs shall have at least 1300 Pa static pressure. The new air handling units shall have primary and secondary filtration. Two supply air fans for redundancy shall be connected to variable speed drives to automatically adjust airflow as filters get loaded. This will ensure that the correct quantity air is supplied to the lab.

Other items required for complete installation shall include but not limited to: pipe work with insulation, brackets and sensors / gauges, strainers, transformation pieces to existing ducting, double skinned insulation, anti- vibration mounts, steel frame and dampers with actuator shut off.

The existing original two AHUs shall be removed and disposed off appropriately as per the Ministry of Health/ countries regulations.

2.0 DUCT WORK

2.1. **Existing Ductwork Details**

Supply ductwork:

The duct material is stainless steel, welded and fully insulated. All visible ductwork in the third-floor plantroom is in generally good condition but will need retesting. However, we understand from the previous reports that the concealed ductwork on the risers and above the first-floor ceiling (and possibly above the second-floor ceiling) is not correctly installed or indeed properly sealable. This concealed ductwork must be tested and remediated or replaced to ensure continuation of the containment boundary from the First Floor BSL3 suite up the supply and extract systems, in particular the extract HEPA filters. The ductwork will be fully pressure tested to determine its pressure classification and if inadequate this will be remediated.

Each lab (TB lab on the 2nd floor and HIV lab on the 1st floor) is supplied with its own air supply ductwork from a dedicated air handling unit located on the roof slab.

Extract ductwork

The duct material is stainless steel fully welded. All visible ductwork in the third floor plantroom is in generally good condition but will need retesting, correctly installed or sealed. This must be tested and remediated or replaced to ensure continuation of the containment boundary from the First Floor BSL3 suit up the supply and extract systems, in particular the extract HEPA filters.. All ductwork, in particular all concealed ductwork will be pressure tested to determine if it is fully sealed. Sections failing the pressure tests will be remediated and then retested early in the project.

Each lab (TB lab on the 2nd floor and HIV lab on the 1st floor) has a dedicated air extract ductwork.

2.2 Recommendations

i) Introduce additional two air supply terminals on each side where the culture machines (MGIT) in the BSL3 Lab are placed as shown in the layout to ensure clean air supply.

ii) Install air recirculation system after extracting HEPA filters. The system should be complete with airtight controlling dampers and the controlling software integrated into the BMS should be capable of managing the minimum fresh air requirement during normal occupancy, moving to full recirculation out of occupancy and have the facility to revert to full fresh air 100% discharge during emergencies (such as a major spill) for which an emergency ventilation button should be provided. The system of recirculation will be utilised to enhance the process of BSL3 suite fumigation allowing for fumigation cycles to pass through the connected ductwork systems ensuring good room mixing on 100% recirculation and then subsequently shifting through the building automation system to 100% purge to outside. A CO2 transmitter that can be used to help regulate and control the BSL3 suite laboratory room air recirculation.

To note: Propose suitable systems, components, controls, operator interfaces and methodologies for approval of the users and technical advisors prior to implementation.

3.0. AIR EXTRACT FANS

Install two inlet centrifugal extract fans one in the BSL 2 and the other in the BSL 3 (air flow matching the existing fans). In the BSL 3 the fan will be installed using the already existing system resistance to enable designing and calculating actual airflows and pressure drops. This should be measured/ operated using the existing fans if possible before removal of the system. In addition, the system dynamic conditions should be obtained from the original commissioning data. to replace the existing belt driven box fans located downstream of the HEPA filters with direct drive fans. The fans to be complete with all installation accessories including transformation ducting.

4.0 HEPA FILTERS

The existing filter housings in the extract systems include 2 x 1 pre-HEPA and 2 HEPA filter boxes in series. The contractor to engage a suitable professional who will carry out a full refurbishment and checking of the filter housings prior to reinstatement of the BSL3 suite laboratory extract systems.Check the filter condition and replace as needed. In addition, check the presence and condition of the bag-in-bag-out filter bags. If not existing, it will be necessary to have a bag change table and bag sealer to facilitate the safe change filter procedure. This should also be supplied during the periodic filter validations.

Allow for decontamination of the 2No. filter housings using paraformaldehyde or equivalent before replacement of filters

Design and propose a suitable system of supply terminal HEPA filters and housings which are capable of validation and testing in-situ. Provide filter condition monitoring systems (terminal HEPA diffusers, size 1200 x 600) A terminal HEPA filter size should match the total supply air flow rate to each BSL3 suite and should be selected and added to augment the existing system. Each new

terminal HEPA should be capable of being correctly tested and have its differential pressure monitored by differential pressure sensors incorporated as additional monitoring points into the BMS.

5.0. BMS FIELD DEVICES IN THE HVAC SYSTEM

Install the following devices in the room:

Room status monitor, Air differential pressure transducer, Differential pressure gage, Humidity/Temperature Transmitter, CO2 Transmitter.

Install the following devices in the air supply duct:

Air Differential Pressure Switch, Duct Air Temperature Sensor, Humidity/Temperature Transmitter,

Install the following devices in the air extract duct:

Air velocity Transmitter, CO2 Transmitter, Dampers actuators.

Install both electronic filter pressure monitoring and differential pressure indication at each filter. As well as differential pressure monitoring of each filter via the building automation system/ building management system to determine when filters are due for replacement.

6.0. RIGGING

Allow for at least three days on site for a crane to rig the new equipment into position and remove old installed equipment.

7.0 CONSUMABLE SPARES

Allow for at least 1-year stock of consumable spares /spare parts (such as filters for BIBO and AHUs) in addition to the ones that will require more frequent replacement like the central extract HEPA filter. Identify with the team where the Spare consumables will be stored in a suitable location and be adequately protected from damage, degradation and theft. 8.0 LABORATORY ACCESSORIES AND EQUIPMENT SPECIFICATIONS

1.0 **EXTRACTOR HOOD AND DRAINAGE**

1.1. EXTRACTOR HOOD

A canopy-type steam capture hood shall be fitted above the autoclave to eliminate any potential difficulties related to steam emission and heat build-up. An air flow rate of 0.5m^3/sec is often specified for a medium sized autoclave, although this should be considered along with the hood size. Exhaust air shall be at a minimum rate of 0.254 m/s (50 fpm) capture velocity.

The minimum size of extractor hood for the autoclave shall be 1 metre square. In the case of top loading autoclave the hood shall be positioned directly above the autoclave. In the case of front loading autoclave the hood should extend beyond the front of the autoclave by approximately 700mm. This will be sufficient to minimise steam and fume emission into the work area, but it may also be desirable to extend the area of the hood to cover the entire autoclave to reduce the amount of heat released into the room. A drip edge shall be provided to collect steam condensate, and the condensate shall be drained to a drain or receptor in the lab.

1.2. DRAINAGE SYSTEM

The drainage system from the autoclave shall prevent dispersion of splashes and steam into the working area. The discharge system shall be sealed and connected directly to the building drainage system. The sealed discharge system shall be vented to a high level by a heat resistant pipe not less than 30mm diameter. The vent pipe shall be directed outside the building. Steam shall not emit from the vent pipe.

The autoclave shall be installed in accordance with BS2646.

END