

PLANNING AND DESIGN GUIDELINES FOR A COVID-19 TESTING LABORATORY

I. GENERAL CONSIDERATIONS

1. **Risk assessment.** A detailed risk assessment must be carried out first in order to determine the specific risk control measures that need to be implemented and a facility-specific needs assessment to define all other design features needed for the laboratory before the construction, repurposing or renovation of a COVID-19 testing laboratory.
2. **Location.** Design and location of the COVID-19 testing laboratory shall be appropriate to the laboratory needs. The COVID-19 testing laboratory shall be located away from residential, high density commercial and similar areas where the facility may impose harm to the general public. It shall be located and arranged to prevent non-related traffic throughout the facility. As such, institution-based COVID-19 Testing laboratories may be a separate building or in an area located behind or away from common walkways between other rooms or buildings of the health facility.
3. **Access.** Access to rooms/areas intended for testing, specimen handling and the like shall be restricted to authorized personnel only. Access to the COVID-19 Testing laboratory per se shall be limited to authorized and concerned individuals. Mechanism for such access restriction to authorize personnel shall be in place (e.g. key card lock, administrative control).
4. **Conformance with Building Laws.** The COVID-19 testing laboratory shall conform to all applicable local and national regulations for the planning and design, construction, renovation, maintenance and repair of its facilities. As such, all plans and drawing requirements such architectural, civil, electrical, lighting and power, sanitary and plumbing and mechanical, and other related trades shall be in accordance with all relevant and existing laws of the Philippines as applicable.
5. **Utilities.** The COVID-19 testing laboratory must be provided with appropriate utilities including clean running water, lighting, ventilation, electric outlets, back-up power, sanitation and drainage systems that comply with building and environmental regulations.
6. **Ventilation.** Controlled environment, and adequate and appropriate ventilation with the acceptable air changes per hour and pressure differential, if applicable, shall be maintained for each specific area of the COVID-19 testing laboratory.

II. FUNCTIONAL AND SPATIAL CONSIDERATION

1. **Spaces Required.** The COVID-19 testing laboratory shall have adequate space or area provided for its various space/room requirements in order to attain the effective and efficient operation of its activities and functions to provide services to clients.

There shall be a dedicated space for each of the following activities:

For COVID-19 laboratories using the non-cartridge-based technology to detect SARS-CoV-2 (e.g. real time Reverse Transcriptase Polymerase Chain Reaction (rRT-PCR)):

- a. Pre-analysis (Specimen reception, virus inactivation and nucleic acid extraction (Pre-PCR));
- b. Reagent storage and handling;
- c. Analysis (PCR); and
- d. Clerical activities (encoding and post analysis)

For COVID-19 laboratories using the cartridge-based technology to detect SARS-CoV-2:

- a. Pre-analysis (Specimen reception and Sample preparation)
- b. Analysis (for Specimen Processing, may be combined with the pre-analysis room)
- c. Clerical activities (encoding and post analysis)

If the COVID-19 laboratories will be performing both non-cartridge-based (e.g. and cartridge-based technology to detect SARS-CoV-2, rooms may be shared, provided that adequate space will be provided for each of the activities performed. The use of biosafety cabinets may be shared between the two platform, and the analysis area for the CBT shall be located in the clean side of the pre-analysis room, or in a separate room.

2. Unidirectional workflow following the above mentioned activities shall be maintained at all times (clean to dirty).
3. Clean Write shop for the clerical activities (data encoding, result generation, reporting) shall be located outside of the clinical work areas but adjacent or easily accessible to prevent contamination.
4. Additional facilities for personnel use, such as toilet, pantry and office facilities (if any) must be located outside of the clinical work areas but easily accessible to prevent contamination. Doffing and donning areas for personnel to leave and store personal items, outer garments (coats) and clean laboratory coats must be provided.
5. Facilities for specimen collection may also be provided. This separate room/area for swabbing/specimen collection shall outside or away from the COVID-19 TL, and must be done in an area where foot traffic is less or controlled. Consideration must be given to patient access, comfort, privacy and infection prevention and control.

Collection area shall have an adequate and well-ventilated space for specimen collection. Physical distancing shall be observed in the waiting area at all times.

6. There shall be sufficient, secured and appropriate storage spaces and conditions provided for laboratory specimens, documents, records, manuals, equipment, reagents, and supplies, both for long term and short term basis. Physical security of specimens and reagents may also need to be considered depending on the risk assessment.
7. The different areas of the COVID-19 testing laboratory shall be planned functionally related to each other to attain efficient workflow.

8. The COVID-19 testing laboratory shall have appropriate and adequate space allocated for the performance of its work, and is designed to ensure the quality, safety and efficiency of the service provided to the user and the health, safety and comfort of laboratory personnel. The laboratory shall evaluate and determine the sufficiency and adequacy of the space allocated for the performance of the work to accommodate its activities and allow for smooth and coordinated work flow.
9. The clinical work area shall be sufficient to accommodate its activities and allow for smooth and coordinated workflow. Its rooms/areas shall be planned to meet the workload described in the functional program.

III. SPECIFIC TECHNICAL REQUIREMENTS

1. **Fire Safety.** The COVID-19 testing laboratory shall conform to the applicable provisions of the 2019 Revised Implementing Rules and Regulations (IRR) of Republic Act (RA) 9514 or the Fire Code of the Philippines. As such, installation of safety systems for fire, including fire alarms, must be considered. There shall also be at least Class C Fire-capable fire extinguishers in the laboratory.
2. **Corridors.** The minimum width for corridor for COVID-19 testing laboratory shall be at least but not limited to 1.20 meters or four (4) feet to allow easy delivery, efficient conduct of activity, and removal and replacement of laboratory equipment. Wider corridors shall be provided taking into consideration of passage of large equipment, movement of people and the activity involved. Also, these corridors and exits shall comply with the statutory code of practice and must be kept clear at all times to allow emergency exit.
3. **Clearances.** Adequate clearances intended for working space in the clinical work area shall be provided, with consideration to the size and type of equipment, activity involved, ergonomics and anthropometrics of the personnel.
4. **Emergency eyewash.** Emergency eyewash shall be provided inside the laboratory, preferably in the pre-analysis room and/or in its doffing area. Locations and quantity of such shall be based on the risk assessment.
5. **Hand-washing.** Hand-washing facilities must be provided in the laboratory where clinical procedures are performed, and in the doffing and donning areas. Running water must be available, preferably operated by a hands-free mechanism.
6. **Pass box.** Adequate and appropriate pass boxes shall be strategically installed in the clinical working areas for the transport of specimen and wastes within the COVID-19 testing laboratory. For internal pass box, it must have a minimum approximate internal dimension of 0.30m x 0.30m x 0.30m. For specimen receiving pass box, it must have a minimum approximate internal dimension of 0.40m x 0.40m x 0.40m. Electrical and/or mechanical interlocking mechanism for the pass boxes shall also be installed.
7. **Equipment, furniture and fixtures.** Equipment, furniture, fittings and the facility itself shall be designed and constructed to be safe, robust and shall be based on the functional program. Large and complex equipment should be installed based on the manufacturer's specifications and recommendations. The following shall also be considered:
 - Weight and dimensions of the equipment;

- Dimensions of doors and corridors to allow passage of equipment and furniture;
- Proper Selection, installation and placement to avoid risks and injury and adequate space required for maintenance;
- Mechanical, environment and electrical requirements of the equipment;
- Dedicating equipment (in dedicated rooms) for use only for tasks with infectious material to avoid cross-contamination; and
- Mounting and securing in position of equipment especially those sensitive to vibration and movement.

Furniture must be smooth, easy to clean, impermeable to liquids and resistant to the chemicals and disinfectants normally used in the laboratory.

Biosafety Cabinets shall be installed in correct location, away from high traffic doors, air supply/exhaust diffusers and alike that compromise its operation, as fluctuations in air supply and exhaust or the operations of equipment may alter the performance standard of the cabinet/hood.

8. **Ceiling Height.** The floor-to-ceiling height of the clinical work area shall be at least 2.60 meters in order to accommodate biological safety cabinet. Other rooms other than the clinical work areas shall be compliant with the requirements of the National Building Code of the Philippines, As such, there shall be at least 2.4 meters clear ceiling height for artificially ventilated rooms and at least 2.7 meters for naturally ventilated rooms, if any.
9. **Electrical System.** There shall be a stable and uninterrupted power supply and a back-up power supply, to ensure continuity of services. Installation of uninterrupted power systems (UPS) for essential equipment is recommended, to guarantee that ongoing activities can be finished in case of power failure and fluctuations.
10. **Plumbing.** Continuous and sufficient supply of potable water shall be made available at all times. Piping systems shall be kept concealed as possible yet should be located where they will be easily accessible for service and repairs with a minimum of disruption of the facility operations.
11. **Information and Communication Technology (ICT).** Provision for ICT and communication systems are recommended for efficient operation of the facility, such as intercom system, electronic access control system and alike. Installation of CCTV and other security surveillance systems are recommendatory, for monitoring of activities and safety in the COVID-19 TL.
12. **Ventilation.** Appropriate and adequate ventilation, exhaust and environmental control requirements shall be given in the each rooms of the COVID-19 testing laboratory depending on the functional program and risk assessment. There should also be sufficient air exchanges and pressure differential, if applicable in each areas of the COVID-19 testing laboratories, depending on the use and contents of the space.
 - a. COVID-19 testing laboratory's ventilation and minimum air exchanges shall be as follows:

Area Designation	Pressure Differential to adjacent area	Minimum total air change per hour (ACH)
Receiving Counter and Post Analysis	Neutral or Slightly Negative	
Pre-Analysis (Specimen Receiving and Specimen Handling / Sample Preparation)	Negative	12 ACH
Template Adding Room (if separate room)	Slightly Negative, but less than Analysis/PCR Room	
Doffing Room	Neutral or Slightly Negative but less than Template Adding Room (if any)	
Donning Room	Positive or Neutral	
Analysis / PCR Room	Negative, but less than Sample Preparation Room	6 ACH (but less than Sample Preparation Room)
Reagent Preparation Room	Positive	

- a. Pre-analysis and analysis rooms shall have an exhaust that maintain adequate air exchange and must be directed away from people and adjacent structures.
- b. Additional exhaust requirement to be considered if the area has adjacent buildings, exhaust stack should not have gooseneck or cap and should be at least 3.00m higher than the highest point of the roof or adjacent building and distant to other taller structures with open windows above. If this criterion was not met, additional exhaust requirement must be installed (e.g. bag-in bag-out (BIBO) HEPA filter box).
- c. Under no circumstances should the exhaust air from the specimen receiving and specimen handling/sample preparation rooms be recirculated to other areas. Great care must be taken if air within other areas in the laboratory is to be recirculated.
- d. The reagent preparation room shall have filtered air supply with a 90-95% efficiency.
- e. Supply intake location must at least 7.62 meters (25 ft.) from the exhaust stack and in opposite direction.
- f. Exhaust air grille locations must be in the dirty side of the laboratory preferably on top of the biosafety cabinet.
- g. Supply air grille locations were on the clean side of the laboratory preferably near entrance doors.
- h. Installation of pressure monitoring device (e.g. magnehelic gauge) per room for monitoring pressure differential especially for specimen receiving area and specimen handling room.

- i. All air conditioning units must be split type.
 - j. Air direction should be away from the biosafety cabinets, isolation hoods and alike.
 - k. Location of switch/es of the HVAC systems (AHU) shall be located outside the laboratory or in the donning area of the laboratory, and access and control shall be restricted only to authorized personnel only, away from the public.
13. **Space.** The COVID-19 testing laboratory shall provide adequate space or area for its various space/room requirements in order to attain the effective and efficient operation of its activities and functions. Adequate areas shall be provided for the procedure, people, activity, furniture, equipment and utility within the space.
14. **Material Specification.** All finishes, work counters and furniture must be made of monolithic, impervious (water proof, impenetrable, impermeable) easy to clean and made up of Anti-bacterial/ anti-fungicidal chemical resistant material.

- a. **Walls and partition.** All walls shall be structurally sound, safe, and sturdy with minimum fire resistant rating as prescribed by the Fire Code of the Philippines for this type of occupancy. Wall finish shall be with impervious, smooth, less terminations, and easy to clean, with anti-bacterial/anti-fungicidal chemical resistant finishes.

Interior walls or partitions and walls shall be constructed from floor to floor height to prevent cross contamination and for fire safety compartmentalization.

- b. **Ceiling.** The ceiling shall be structurally sound, monolithic, safe and made of sturdy impervious (water proof, impenetrable, impermeable) materials and easy to clean, with anti-bacterial/ anti-fungicidal chemical resistant finishes. The ceiling configuration of the clinical work area should be as flat as possible and shall avoid edges and crevices that are difficult to clean and to prevent accumulation of dirt in the ceiling.

Lighting fixtures in the clinical work area shall be surface mounted, and with impervious and smooth cover.

- c. **Flooring.** The floor material and finish must be monolithic, structurally sound, safe and made of sturdy impervious (water proof, impenetrable, impermeable) materials, with anti-bacterial/ anti-fungicidal chemical resistant finishes and easy to clean. Floors shall be seamless with all corners and edges are curved/coved to a height of at least 6 inches (152.4 millimeters) towards the wall.
- d. **Work counters.** Work counters shall be provided with finish that is monolithic, seamless and does not support bacterial growth, durable, non-porous, resistant to heat and chemicals, smooth and easy to clean and stain and dirt resistant. The width of the work counter shall be at least 600mm (750mm or 30 inches is preferred). Sink or lavatory, preferably stainless steel, with faucet, preferably gooseneck, with adequate supply of water shall be provided.

Backsplash or wainscoting is recommended, preferably with the same material with the countertop finish or its equivalent with at least 400mm high. Edges and terminations of

the work counters shall have curved edges and sealed wherever possible for easy cleaning.

- e. **Windows.** The external/ internal windows in the clinical working area shall employ closed and fixed tempered/ safety glass window and shall be properly sealed/caulked.

Windows and openings in other areas shall be in compliance with the requirements of Rule VIII of the National Building Code of the Philippines. If operable window in these areas is utilized, it should be fitted with arthropod-proof screens.

- f. **Doors.** The minimum clear opening for the main door/s of the COVID-19 testing laboratory and the clinical work area shall be at least 1.00 meters in order to accommodate entry and exit of equipment and safe movement of waste and materials. Doors of the clinical work area shall be fire rated, properly and appropriately labelled, lockable and secured, have a self-closing mechanism and shall adopt chemical resistant and easy to clean door finish.

Doors to the clinical work area must have a vision panel to see into the laboratory. Internal laboratory doors must be fitted with vision panels so that workers are visible and to prevent collisions.

- g. **Others.** Carpeting, rugs, fabrics and other similar pervious and absorbent finishes shall be avoided.

All room gaps and penetrations (passageways in the wall, floor, ceiling or other surface) shall be properly sealed / caulked so that the airtightness of the laboratory room or space can be achieved for containment.

- 15. **Waste Management.** There shall be adequate and appropriate facilities for the efficient handling, storage and management of wastes, including infectious wastes, in accordance with the provisions of the latest edition of the DOH Health Care Waste Management Manual, COVID-19 Waste Management Sourcebook, and other DOH issuances, Republic Act 6969, and other relevant statutory requirements and code of practice.

Appropriate methods for decontamination of waste such as disinfectants and autoclaves, must be made available within the laboratory.

- 16. **Additional Requirement/s.** The COVID-19 testing laboratory shall provide compliance for additional requirements to consider heightened control measures based on the conducted risk assessment, in adherence with the requirements of laboratory biosafety and biosecurity, to ensure a safe working environment. The heightened control measures implemented should be appropriate and sufficient to reduce the specific risks that contribute to the likelihood and/or consequence of an exposure and/or release.