



COVID-19 RESPONSE UNIT

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- 02** COVID-19 Response Unit Prototype & Critical Flows
- 03** Critical Network Components & Considerations
- 04** COVID-19 Response Unit
- 05** Resources
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01 | BRIEFING

The COVID-19 Pandemic has presented a challenge for Healthcare Systems around the world. While many checklists have been developed focusing on developed world responses and the handling of COVID-19 patients, there has been a significant gap in the response in developing countries. The intent of this checklist is to be used by Healthcare Providers as a tool to assist in the strategy for COVID-19 response with regional realities.

In discussions with many international partners, we have found that current healthcare facilities are overwhelmed with pre-existing care for the communities they serve and most facilities do not have the capacity to take on the surge of COVID-19 patients. This checklist is intended to be used when it is understood that a facility does not have the surge capacity.

The focus of this document is to provide clarity relative to the fundamental layout of space as well as patient and staff flows to provide optimal care and safety in the reduction of the spread of the virus. Many countries have developed various levels of infrastructure to prepare them for pandemic responses. The response will vary depending on the existing infrastructure systems in place currently, but

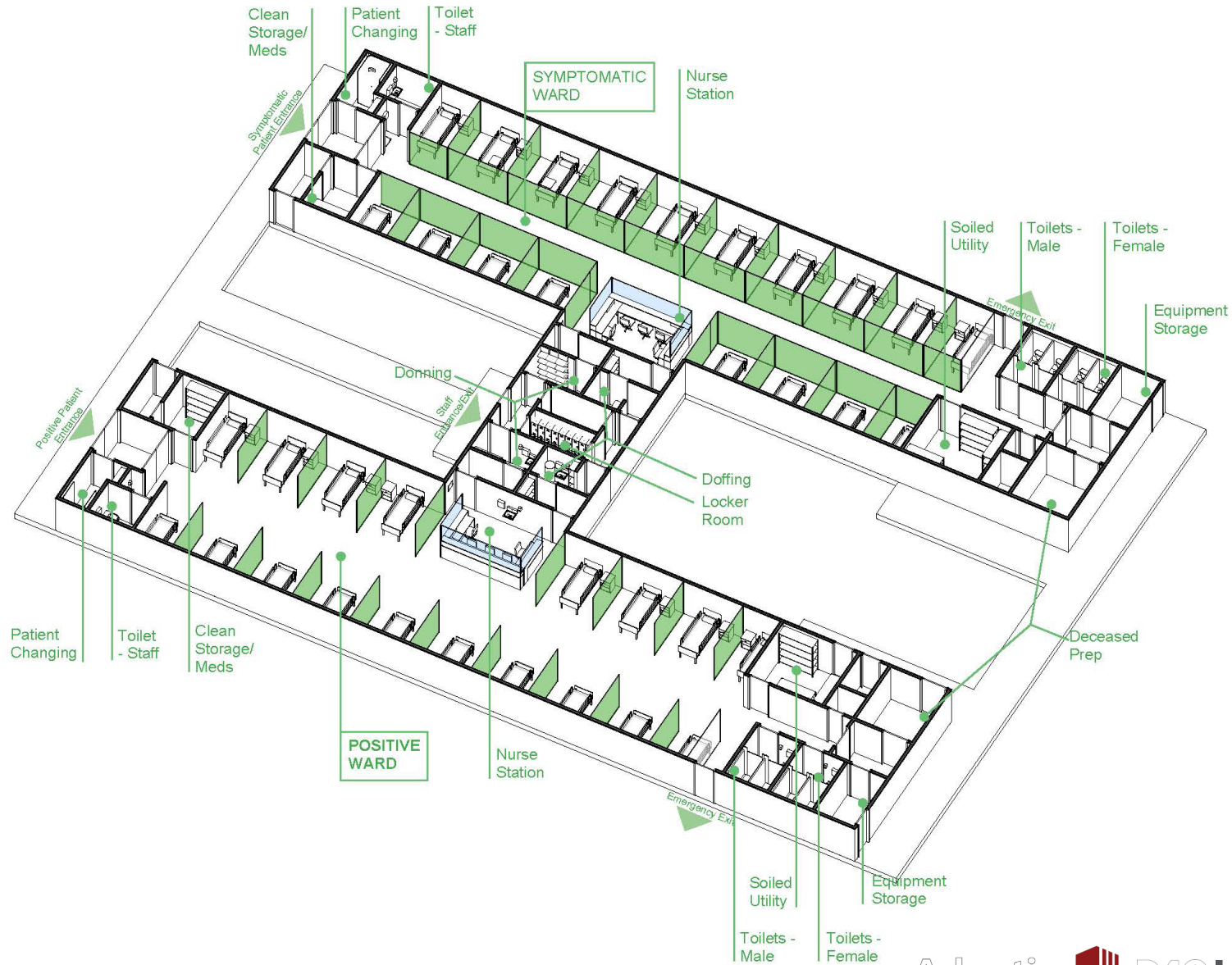
the components of the COVID-19 Response Unit as well as the critical flows listed below will be applicable for all scales of Response Units. The required capacity will need to be determined locally and the scale of the actual unit based off of the required capacity.

Although the COVID-19 is anticipated to have a profound effect on healthcare systems in the future, this document is intended to propose near term options for treating patients with COVID-19 in multiple settings.

Please note that the nature of the ongoing COVID-19 pandemic is fluid and we anticipate further evolution in solutions based approaches relative to near term facilities. We have developed the following document with flexibility in influencing the decision making process to best adapt to the ever evolving situation. This document is not meant to be all encompassing, we aim to provide addenda and version updates in the future when warranted.

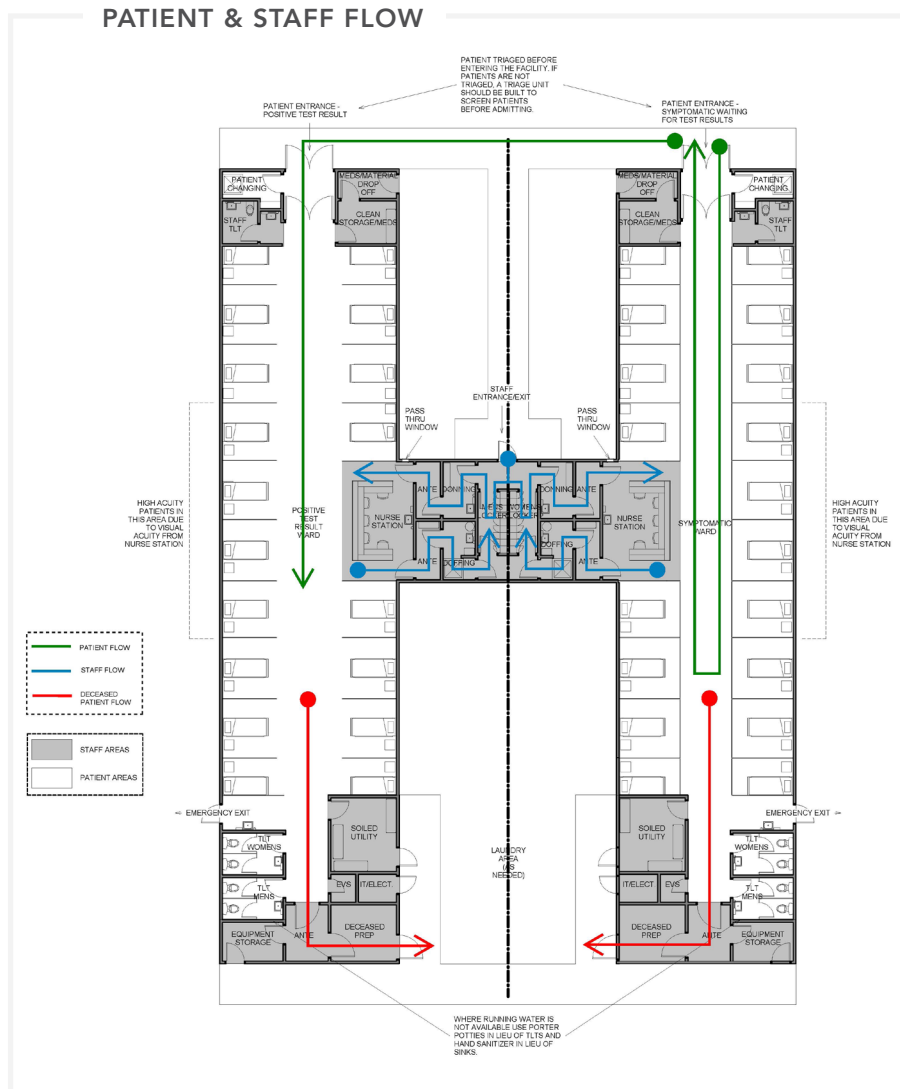
02 | COVID-19 RESPONSE UNIT PROTOTYPE

The COVID-19 Response UNIT shown below is a visual representation of the complete unit with a separate Symptomatic Ward, Positive Patient Ward, and Staff Entrance Exit. The components of the space and the flow will be described further in the following pages.



02 | COVID-19 RESPONSE UNIT PROTOTYPE & CRITICAL FLOWS

The flows noted in the diagrams below are the critical flows that should be considered in all COVID-19 Response Units. While the organization of the components will vary depending on the Response Unit type, the critical flow and components should remain consistent and health care providers should ensure that the fundamental principles inherent in the demonstrated flows are clear to all staff.



03 | CRITICAL NETWORK COMPONENTS & CONSIDERATIONS

There are critical components of an effective COVID-19 response system that will need to be coordinated by each health care provider to support their COVID-19 Response Units. The following includes some but not all of these components:



Testing

It is critical to test potentially infectious patients to gain insight and track regional disease trends to be able to control the rapid spread of the virus. With Community Health workers being a critical component to most healthcare systems, they should be mobilized to go to the community health posts to identify and triage the highest risk patients.



Laboratory

Relationship with a Laboratory or Laboratories that can receive and process the tests quickly and accurately is critical. Ensure there is the ability to provide lab technicians samples without having them enter the unit.



Screening

The healthcare facility should have a screening area to set up the front of the facility to quickly triage patients and send COVID-19 patients to the Response Unit or non-COVID-19 patients to the main facilities.



Waste Management Systems

Prepare to store and dispose of vast amounts of waste generated including but not limited to PPE, laboratory waste, medical waste, etc. Appropriate medical waste removal must be considered.



Supply Chain and Storage Capacity

Consider the supply of medical equipment, PPE, reagents, and other supplies as well as the on site storage of those supplies in close proximity and with easy access for the COVID-19 Response Unit.

Ensure there is secured storage for medications and cold storage capacity as needed.



Ambulance Services

Ensure there are dedicated vehicles available to retrieve COVID-19 patients in the community.



Laundry

Ensure access to laundry to effectively clean all linens and reusables. Provide separate laundry from the general hospital, that is adjacent to the unit and accessible from the patient wards to facilitate infection control measures laundry where possible.



Access to Food

Ensure access to food for the patient and staff populations while providing or receiving care.



Morgue

Healthcare providers should develop the process of disposing of the bodies of deceased patients taking into account potential surge requirements.



Family Members as Part of Healthcare Delivery

Many healthcare providers rely on patient family members as a critical component to providing quality care to their patients. The healthcare provider needs to develop a strategy to effectively manage patient family members so as to reduce the spread of the virus and keep the family members and staff safe. Patient family members should not be allowed to enter the unit.



Staff

It is critical to understand the sacrifices the staff will make during this pandemic and provide adequate spaces for them to take breaks, rest, and properly remove all of their PPE.

Ensure healthcare staff members are safe within the communities they live in as well, as stigmatizations may develop around them being carriers of the virus.

04 | COVID-19 RESPONSE UNIT

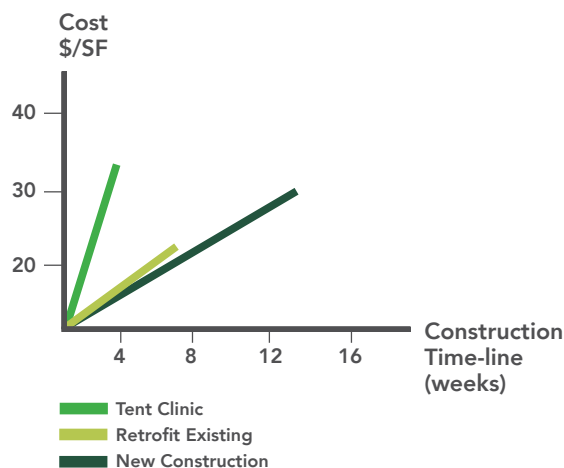
The following checklist considers the critical components of the COVID-19 Response Units including minimum size recommendations per space and the critical flow between spaces. These components and flows are the critical components that should be included in all COVID-19 Response Units. As noted on previous pages, while the organization of the components will vary depending on the Response Unit type, the critical flow and components should remain consistent and health care providers should ensure that the fundamental principles inherent in the demonstrated flows are clear to all staff.

Types of COVID-19 Response Units:

- Conversion of existing facilities into COVID-19 Response Units.
- Construction of a new COVID-19 Response Unit utilizing tents.
- Construction of a new COVID-19 Response Unit utilizing locally available materials.

Considerations to Determine Type of COVID-19 Response Unit to Implement

The graph below has been developed by reviewing typical costs and time lines to implement the COVID-19 Response Unit in various settings. Each health care provider will have different factors to consider depending on supply chain, time frame, and available funds.



*Figures shown are representative of scale to represent average construction cost and time-line considerations for each unit type. Actual \$/SF and weeks to build will vary based on region and scope.

Considerations to Determine Location of COVID-19 Response Unit

○ Proximity to Existing Facilities

Many COVID-19 Response Units will be operating near an existing healthcare facility to efficiently utilize the existing access to the following:

- Healthcare Staff
- Electrical Capacity
- Medical Gases
- Mechanical Systems
- Potable Water Systems
- Sanitation Systems

Ensure that if the COVID-19 Response Unit is located on an existing healthcare campus, that it is located to enable the existing healthcare facility to continue operations while not putting non-COVID-19 patients and staff at risk.

If the COVID-19 Response Unit is on existing hospital grounds, proper triage should be done at the entrance of the hospital to direct COVID-19 patients directly to the facility and mitigate the spread of the virus on the campus.

Where COVID-19 Response Units are not in proximity to existing healthcare facilities, ensure there is access to the infrastructure systems noted above.

○ Access

- Ensure the location of the COVID-19 Response Unit is accessible to patients, staff, ambulances, and supply chain while ensuring minimal cross over of contaminated flows.
- It is critical to have efficient access for patients, staff and supply chain to ensure the success of the facility.

04 | COVID-19 RESPONSE UNIT

○ Capacity and Use

- Review the scale of the facility to ensure the projected bed capacities can fit into the existing facilities.
- If utilizing an existing building, review the past uses of the facility to ensure there are no hazardous components of the facility that would negatively affect staff and patients.

○ Flexibility and Expandability

- Review the scale of the site and the facility and determine where growth may occur in the case that the projected bed estimates were lower than the actual needs. In many cases, the amount of healthcare staff, supplies available, and funds to implement will determine the scale of the facilities. Where a more permanent solution is developed and implemented, develop a strategy for future use of the facility to build in flexibility.

○ Security

- Ensure patients and staff can access the site safely and are not in danger once they are providing and receiving care on site.
- Ensure the area around the unit can be enclosed to separate the unit from adjacent facilities.

COVID-19 Response Unit Components

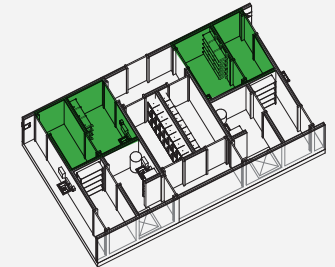
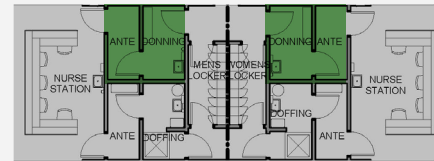
○ Access to the Response Unit

Staff Donning

- Minimum size recommendation: 90 SF (8.5 M2) per donning space
- Dedicated Staff entrance for staff into a locker room to change out of street clothes and into scrubs. From the Locker Room enter into Donning to don PPE then enter the unit through an Ante Room.

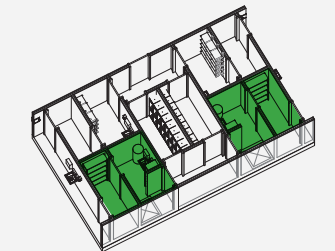
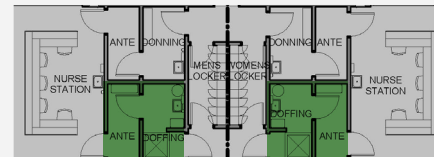
(Staff Donning Continued)

- One access point should be directly to the outside and the other access point is to the unit.
- PPE Storage Rack or Cabinet
- Space to apply PPE
- Handwashing facility (see below)



Staff Doffing

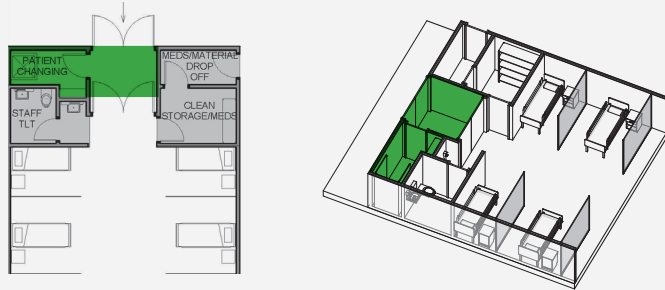
- Minimum size recommendation: 90 SF (8.5 M2)
- Dedicated Staff exit from the unit into an Ante Room. Enter into Doffing and remove PPE and shower. Enter into the locker room to change back into street clothes.
- One access point should be directly to the outside and the other access point is to the unit.
- Accommodation for bins for PPE disposal
- Shower for staff to shower down as needed before leaving the facility.
- Handwashing facility (see below)



04 | COVID-19 RESPONSE UNIT

Patient Entry

- Dedicated entry for patients wide enough for stretchers to enter
- Changing area for patients to change into hospital uniform where provided. Shower for patients to shower before leaving the unit.



COVID-19 Positive Ward

- A specific ward focused on patients who have been tested and confirmed to have COVID-19 separate from a ward with symptomatic patients who have not yet been tested.

COVID-19 Symptomatic Ward

- A specific ward separate from COVID-19 positive patients for patients with symptoms but waiting for their test results.
- Critical to have proper patient separation in this ward to avoid infecting patients that receive negative test results.

COVID-19 High Acuity

- Patients should be located with the highest level of visual acuity to the Nurse Station. This level includes critical care, emergency care, and advanced cardiovascular life support.

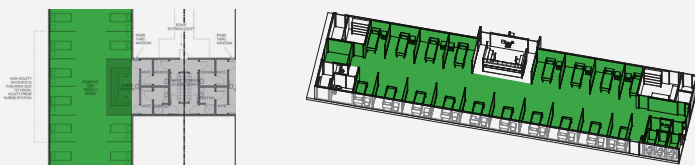
COVID-19 Low Acuity

Patients should be located further away from the Nurse Station. This level includes patients mildly/moderately symptomatic who may need oxygen but who do not require extensive nursing care and can generally move about on their own.

- Ensure that Lower Acuity patients have access to an exterior area that is separated from other facilities.

○ Patient Space

- Special considerations should be taken for patients with pre-existing conditions who are at higher risk.
- Patients should be separated by washable partitions
- 6 feet (2M) between beds where possible
- Electric power to be provided on the wall by the patient head where possible
- Natural daylighting and airflow should be provided for the unit.
- Directional airflow to be provided at the Patient Space with a minimum of 12 ACH. Where mechanical ventilation is not possible, orient the building to capture the prevailing winds and provide high exhaust louvers to flush contaminated air above.



04 | COVID-19 RESPONSE UNIT

○ Sanitation/Handwashing

- 1 handwashing station for every 6 patients.

Where Running Water is Available:

- Sink
- Soap
- Paper towels
- Gloves
- Trash
- Hand Sanitizer

No Running Water:

- Chlorinated Water Stations
- Paper towels
- Gloves
- Trash
- Hand Sanitizer

Or

- Hand Sanitizer
- Gloves
- Trash

Toilets

- Patient access to toilets.
- Minimum of 1 toilet per 5 patient beds where possible.
- Suspected cases should use different toilets than confirmed patients.
- Ensure a routine for sanitizing the toilets after each use to avoid further contamination. There should be a dedicated toilet for staff within the unit where possible.

○ General Support Spaces and Considerations

Patient Dignification

- Patients will be unable to see their family members for extended periods of time. Providing music or television where possible as well as access to natural light is critical in providing a dignified space for patients and staff.

Washable Materials

- Non porous and antimicrobial materials should be used where available. Otherwise all surfaces should be easily washed down.
- It is ideal to use plastic tarps or other washable materials so patient & staff areas can be hosed down frequently.

Directional Airflow

- Ensure that the contaminated air is not recirculating into the space.
- Ensure that any exhaust from the patient care area is not being vented directly to a trafficked space.
- Recommend to have 12 air changes per hour where possible.
- Natural ventilation is a viable option when Mechanical ventilation is not viable but will not provide the unit with 12 air changes per hour.

Medical Gas

- Provide medical gas outlets at patients bedsides either as a Point-of-Use or piped in system where possible.

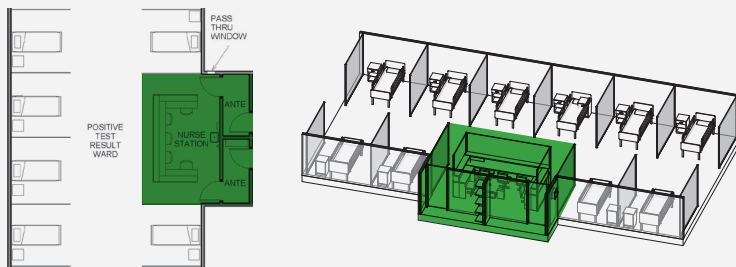
Electrical Outlets

- Provide electrical outlets at patient bedsides.

04 | COVID-19 RESPONSE UNIT

Visual Acuity

- The care provider station should be located as centrally as possible to allow care providers to have visual access to patients.
- The care provider station should be shielded from the ward with a transparent material to allow for visual acuity and provide the staff with a layer of protection.



Staff Break Area

- Provide staff with an area they can exit the ward and take a break during their shift. The area should allow the staff to disconnect and have a meal away from the ward.
- Include storage for staff belongings and security to ensure belongings remain in place while they are on their shifts.

Screening Area(s)

- An area where patients can be screened before entering the facility and their vitals taken in advance of entering.

Counseling Area

- A private area where healthcare providers can speak privately with patient family members and on the condition of the patient

Life Safety

- Ensure the life safety meets local building regulations and proper amounts of egress are provided for the size of the unit.

IT/Electrical Room

- Provide access to the IT/Electrical Room from the exterior only to allow staff to work as needed without entering the unit.

Soiled Storage

- All items soiled by patients should be held in a soiled storage room. It is ideal for this room to have direct access to the outdoors for removal. If direct access is not allowed, proper precautions need to be taken when removing the soiled good from the unit.

Clean Storage & Meds

- A closed storage space to hold all the clean supplies and meds needed for patient care. Provide a door directly to the exterior for resupply and a small drop off area between the Clean Storage/Meds Room and the exterior so supply staff do not need to enter the unit.

Equipment Storage

- Dedicated equipment storage space to hold ventilators and other equipment needed for patient treatment.

RESOURCES

NBBJ Plan for Prefabricated Augmentation of US Army Corps of Engineers A2HC Concept

<https://vimeo.com/404048212>

HGA and The Boldt Company build STAAT Mod™ critical care units to address the COVID-19 hospital bed shortage

<https://prismpub.com/hga-and-the-boldt-company-build-staat-mod-critical-care-units-to-address-the-covid-19-hospital-bed-shortage/>

STAAT MOD

<https://hga.com/staat-mod>

Guidance for Reopening Decommissioned Healthcare Facilities to Accommodate COVID-19

<https://www.cannondesign.com/news-insights/fos-service/guidance-for-reopening-decommissioned-healthcare-facilities-to-accommodate-covid-19/>

NHS Nightingale Hospital

https://www.linkedin.com/posts/bdp-building-design-partnership-ltd-_nhs-nightingale-excel-build-information-poster-activity-6650862724026781696-h7TH

Considerations for Alternate Care Sites:

Infection Prevention and Control Considerations for Alternate Care Sites

<https://www.cdc.gov/coronavirus/2019-ncov/hcp/alternative-care-sites.html>

World Health Organization - Country & Technical Guidance - Coronavirus disease (COVID-19)/Technical Guidance

<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance>

Centers for Disease Control and Prevention - Infection Control Guidance for Healthcare Professionals about Coronavirus

(COVID-19) <https://cdc.gov/coronavirus/2019-ncov/hcp/infection-control.html>

CONTACT

If you need assistance reviewing these standards, planning the implementation of your COVID-19 Response Unit, or have any questions on the information presented in this packet please contact the following collaborators:



Robert Freni
AIA | LEED AP BD+C | Architect
CEO & Co Founder, Adaptiv Architecture & Planning
rwfreni@adaptiv.org
www.adaptiv.org

Adaptiv provides planning and architecture services to emerging communities across the globe focusing on health care, education and community master planning. Our services employ a community centric, collaborative methodology of research and design thinking to problem solve and develop resilient solutions that adapt to the ever changing needs of the communities we serve.



Timothy Hickory
Director of Operations, Construction For Change
tim@constructionforchange.org
www.constructionforchange.org

Construction for Change partners with nonprofit organizations to build spaces where people can become healthier, better educated, and increase economic mobility.



Jason-Emery Groen
OAA | OAQ | AIBC | MAA | NSAA | AANB | RAIC
Vice-President, Design Director, HDR
jason.emery.groen@hdrinc.com
www.hdrinc.com

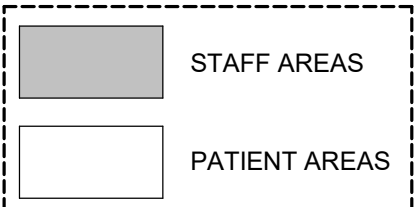
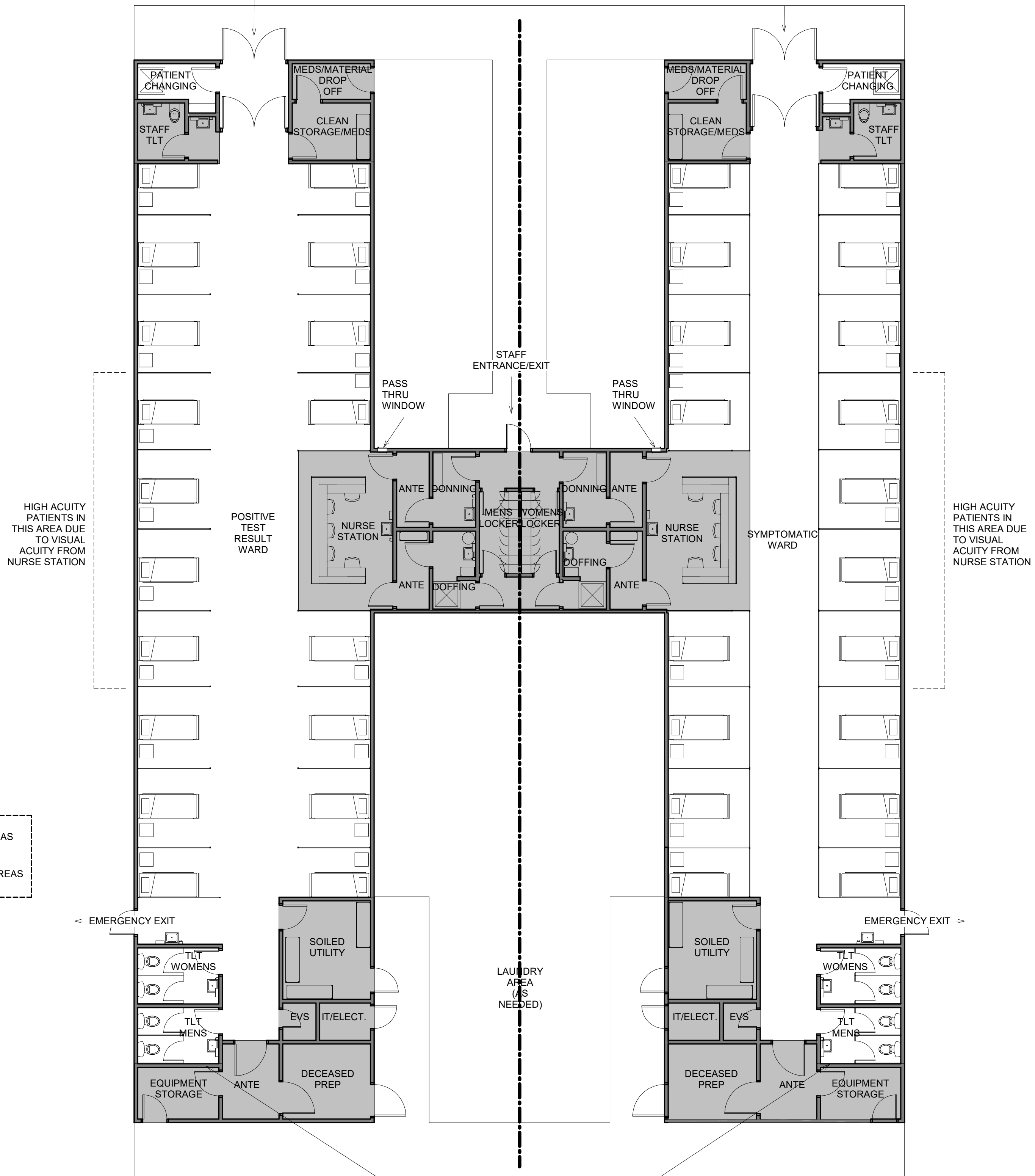
HDR specializes in architecture, engineering, environmental and construction services. Our multidisciplinary teams span more than 200 locations worldwide and include scientists, economists, builders and analysts opening the doors to what's possible each day. Through our Design 4 Others initiative, HDR employees provide architecture, engineering and planning services to communities in need around the world.

COVID 19 RESPONSE UNIT

PATIENT TRIAGED BEFORE ENTERING THE FACILITY. IF PATIENTS ARE NOT TRIAGED, A TRIAGE UNIT SHOULD BE BUILT TO SCREEN PATIENTS BEFORE ADMITTING.

PATIENT ENTRANCE - POSITIVE TEST RESULT

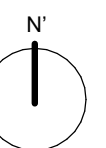
PATIENT ENTRANCE - SYMPTOMATIC WAITING FOR TEST RESULTS



DISCLAIMER: The intent of this design is to show the flow of the facility based off of researched best practices. We as the designer are not liable for the implementation of this design. All implementing parties should update this design to fit the site, materials, staffing, and estimated patient intake and consult their infectious disease specialist before implementing.

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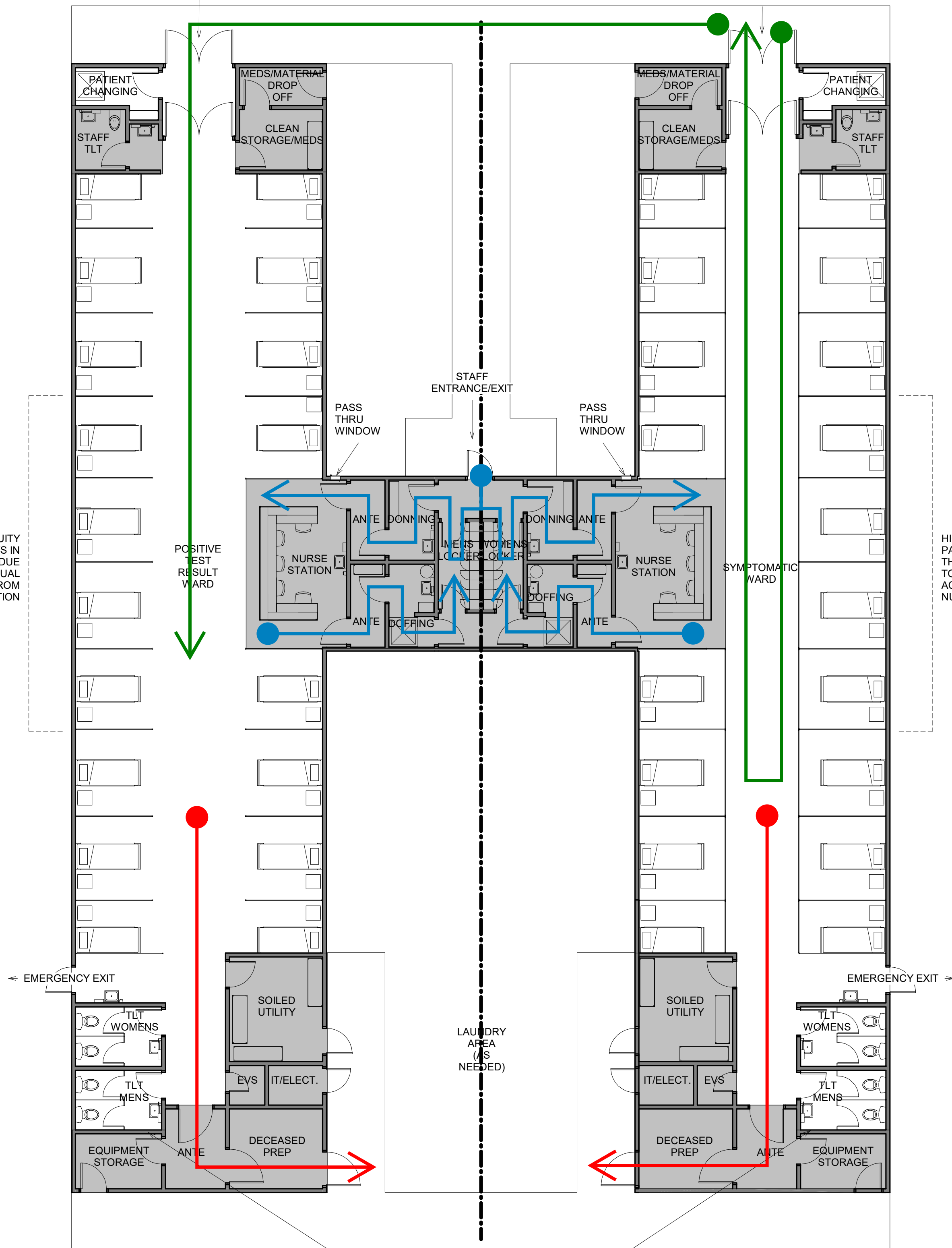
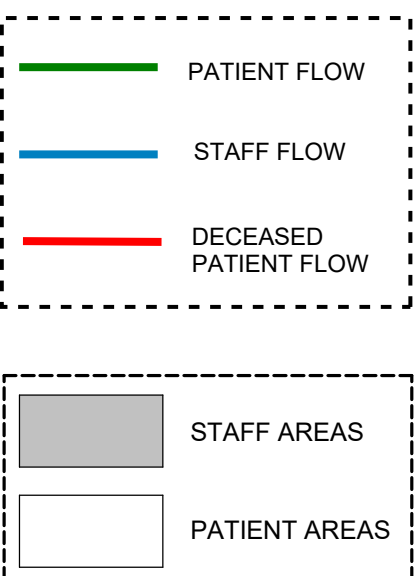
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PATIENT ENTRANCE - POSITIVE TEST RESULT

PATIENT ENTRANCE - SYMPTOMATIC WAITING FOR TEST RESULTS

HIGH ACUITY PATIENTS IN THIS AREA DUE TO VISUAL ACUITY FROM NURSE STATION

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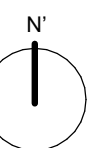


WHERE RUNNING WATER IS NOT AVAILABLE USE PORTER POTTIES IN LIEU OF TLTS AND HAND SANITIZER IN LIEU OF SINKS.

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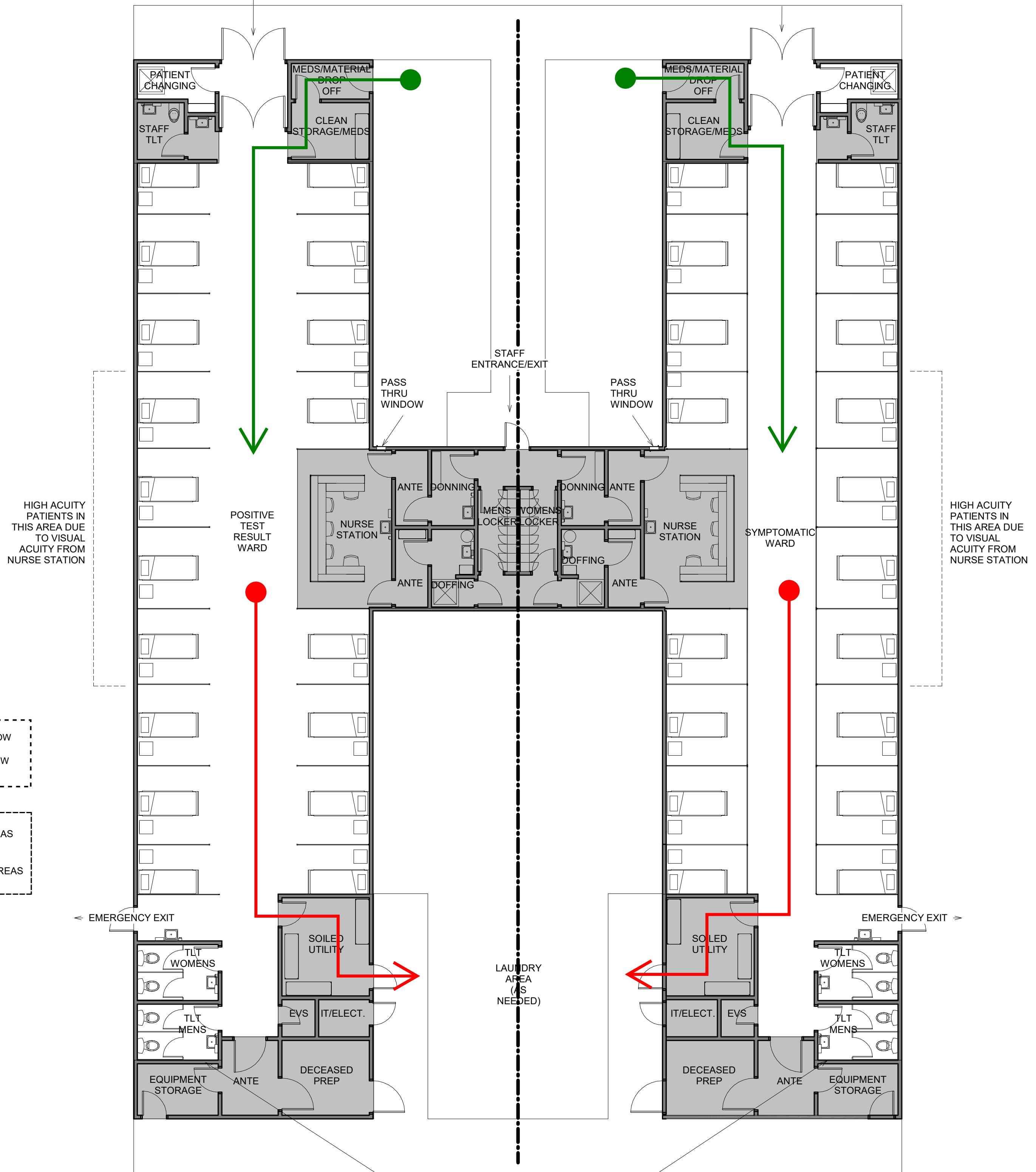


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PATIENT ENTRANCE - POSITIVE TEST RESULT

PATIENT ENTRANCE - SYMPTOMATIC WAITING FOR TEST RESULTS

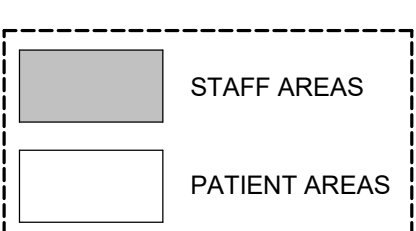


HIGH ACUITY PATIENTS IN THIS AREA DUE TO VISUAL ACUITY FROM NURSE STATION

POSITIVE TEST RESULT WARD

SYMPTOMATIC WARD

HIGH ACUITY PATIENTS IN THIS AREA DUE TO VISUAL ACUITY FROM NURSE STATION



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