

Guidelines for Developing COVID Care Centres (CCC) and Dedicated COVID Health Centres (DCHC) in Resource-deficient Contexts

4th June 2020

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About Indian Institute for Human Settlements (IIHS)

Design Lab at IIHS: Previous experience in healthcare projects

Introduction (1/3)

In India and around the world, a number of sites are innovatively being repurposed into COVID treatment centres. Examples include railway coaches, stadiums, schools, resorts, hostels, ships, and shipping containers. New temporary facilities have also been developed for this.

In order to support such efforts to increase COVID-19 response infrastructure, the Indian Institute for Human Settlements (IIHS) has created a set of '**Guidelines for COVID Care Centres (CCC) and Dedicated COVID Health Centres (DCHC) in Resource Deficient Contexts**'.

These guidelines can be used to set up centres in areas with limited resources, such as small cities, towns and villages in India, to care for to care for COVID patients with **mild to moderate symptoms**.

These guidelines will be useful for governments, project leads of such facilities, architects, engineers, service infrastructure providers, and private organizations developing such facilities.



Indian Railways has converted 2,500 coaches into isolation wards; Source: [Livemint](#)



Nandambakkam Trade Center in Chennai converted into 550-bed quarantine facility; Source: [The News Minute](#)

Introduction (2/3)



These guidelines have been developed based on advisories of the Government of India's Ministry of Health and Family Welfare (MoHFW), Indian Council of Medical Research (ICMR) and the World Health Organization (WHO). This document has 5 parts:

Part 1: Short-listing of Potential Sites, where criteria and checklist for selecting a site have been provided.

Part 2: Functional Arrangement of CCC & DCHC, which contains a schematic representation that shows the risk zone and flows of patients, health care workers (HCW) and service staff, in order to minimize risk within the facility.

Part 3: Layouts for Different Site Typologies, where designs have been provided for a few representative site typologies such as buildings with or without an open ground and railway stations, and temporary constructions for greenfield sites.

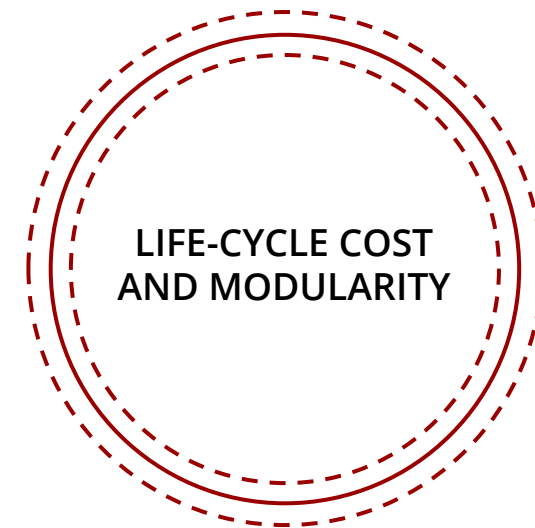
Part 4: Materials and Construction Systems, which contain criteria used for selection of materials and conceptual drawings and list of recommended materials.

Part 5: Setting up Water and Sanitation Infrastructure, which contain decentralized options that are executable, and do not emerge as a burden on local services.

Introduction (3/3)

The **key concepts** that have been used to develop these design guidelines:

1. Focus on reducing the spread of infection in these centres by managing flows of patients, HCW and service staff.
2. Applicability in areas with limited resources such as low budgets, availability of sites materials, labour, basic services and time constraints.
3. Enabling expandability of centres, through modular construction, and accounting for life-cycle of the retrofitted and temporarily constructed centres, given the unpredictability of the pandemic.



Part 1:

Short-listing Potential Sites

- 1.1 Criteria for short-listing a potential site
- 1.2 Recommended sites that meet criteria
- 1.3 Estimating construction requirements based on site typologies

1.1 Criteria for short-listing a potential site

Criteria A: High priority

- 1 Presence of buildings/structures with separate rooms for isolation wards OR suitability for making temporary separate rooms
- 2 Availability of WSS facilities (water supply, toilets, connection to sewerage system) AND potential for augmenting through decentralized WSS infrastructure
- 3 Accessible by road AND not located in low-lying/flood-prone areas
- 4 Availability of fire prevention/fighting measures
- 5 Adequate separation from habitation BUT in proximity to hospitals, to transfer patients if required
- 6 Presence of electricity connection
- 7 Good quality weather-proofing and infestation control OR ease of ensuring the same

Criteria B: Should be met, if possible

- 1 Availability of accommodation nearby for caretakers/service staff
- 2 Universal access
- 3 Presence of security features OR ease of the required upgrade
- 4 Presence of open ground to expand facility
- 5 A proximate helipad

See [Annex 1: Site Assessment Checklist](#)

1.2

Recommended sites that meet criteria

Recommended sites (in order of priority)

- 1 **Stadiums / maidans** (facility to be completely fabricated)
- 2 **Convention and exhibition centres** (covered halls)
- 3 **Government hotels, inspection bungalows, traveller shelters**
- 4 ***Dharamshalas and ashrams***
- 5 **Schools and hostels** (building and grounds)
- 6 **Railway stations** (platforms; isolation wards in parked train coaches)
- 7 **Airports** (terminal building)
- 8 **Ports** (building and docks)

Other sites to consider

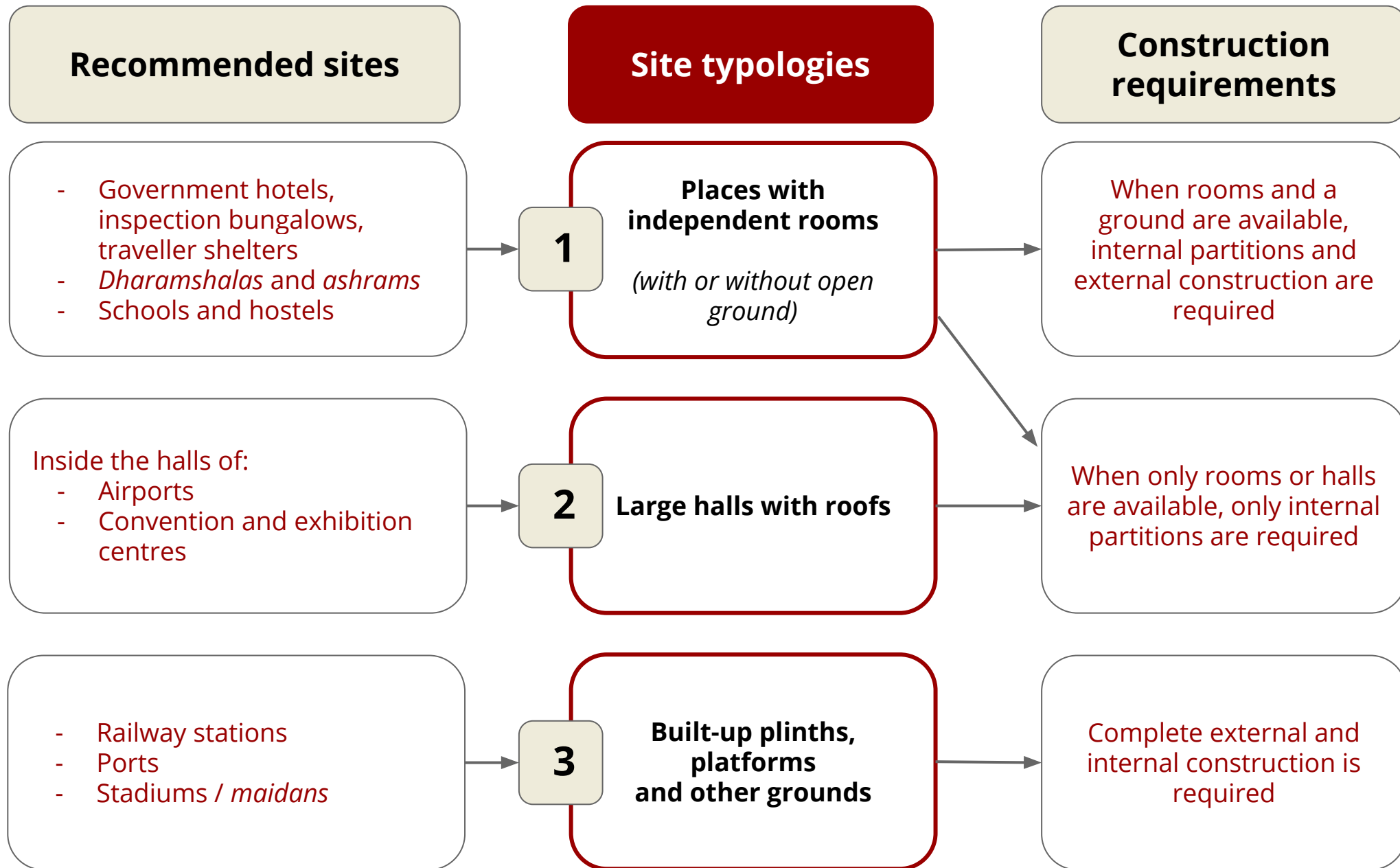
- 9 **Congregation spaces** (places of worship such as temples, gurudwaras and mosques, and meditation halls)
- 10 **Marriage halls / *Kalyan mantapas / Barat ghars***
- 11 **Industrial sheds and warehouses**
- 12 **Unoccupied housing projects** (satellite towns; peri-urban areas)

Notes

- Criteria may not be fully met in all recommended sites.
- Concerned authority to ensure that selected site must meet as many criteria as possible, especially high-priority criteria.

1.3

Estimating construction requirements based on site typologies



Part 2:

Functional Arrangement of COVID Care Centres (CCC) and Dedicated COVID Health Centres (DCHC)

- 2.1 Overview
- 2.2 Description of areas
- 2.3 Details of waiting and screening areas
- 2.4 Area requirements

2.1 Overview

FUNCTIONS OF CENTRES

SCREENING areas where people get triaged, and if required their samples taken.

WARDS including observation and isolation wards.

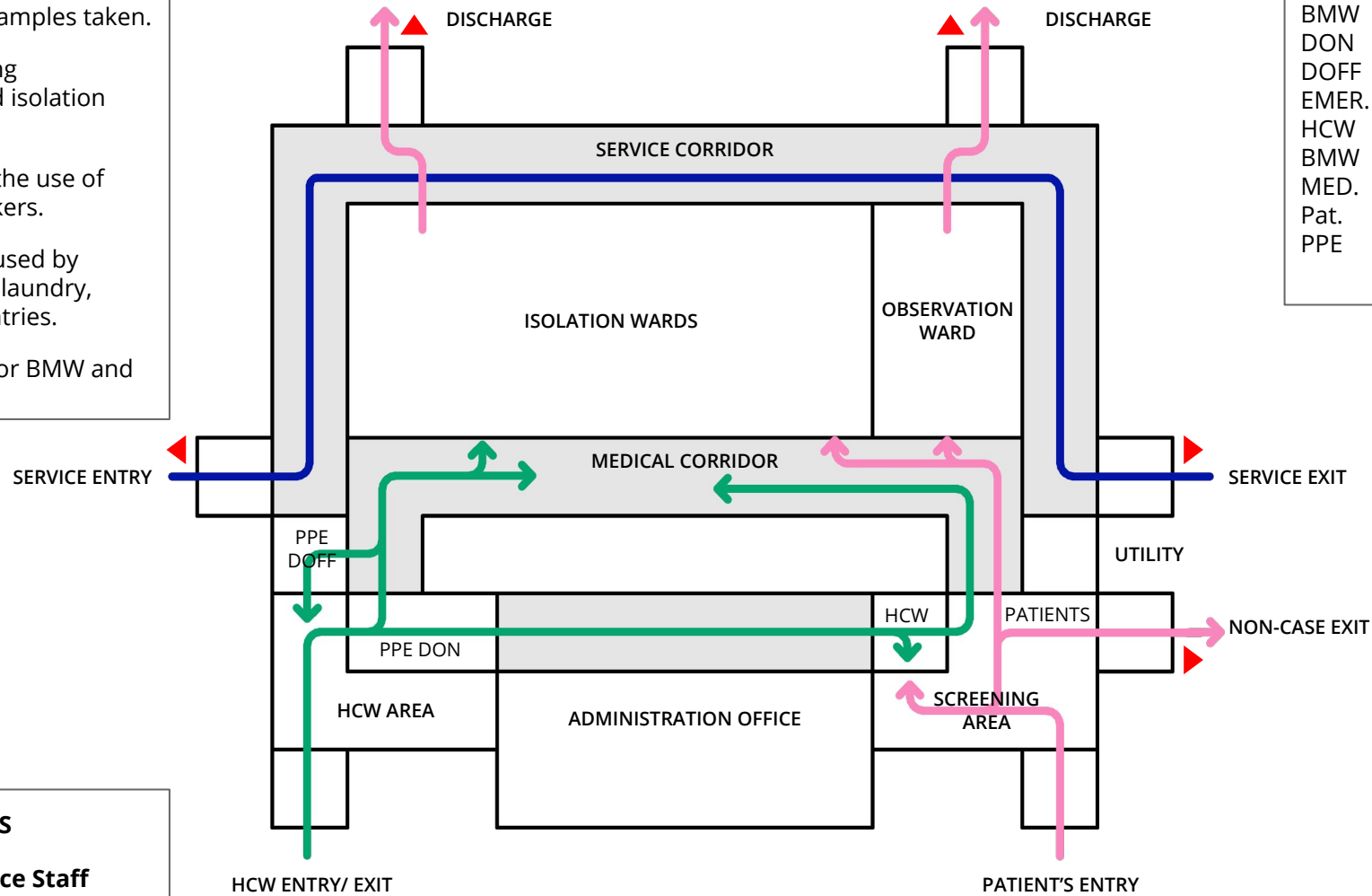
HCW AREA for the use of healthcare workers.

SERVICE areas used by service staff for laundry, kitchen and pantries.

UTILITY areas for BMW and PPE disposal.

ABBREVIATIONS

ADMIN.	Administration
BMW	Bio-medical Waste
DON	Donning
DOFF	Doffing
EMER.	Emergency
HCW	Healthcare Workers
BMW	Bio-medical Waste
MED.	Medical
Pat.	Patient
PPE	Personal Protective Equipment

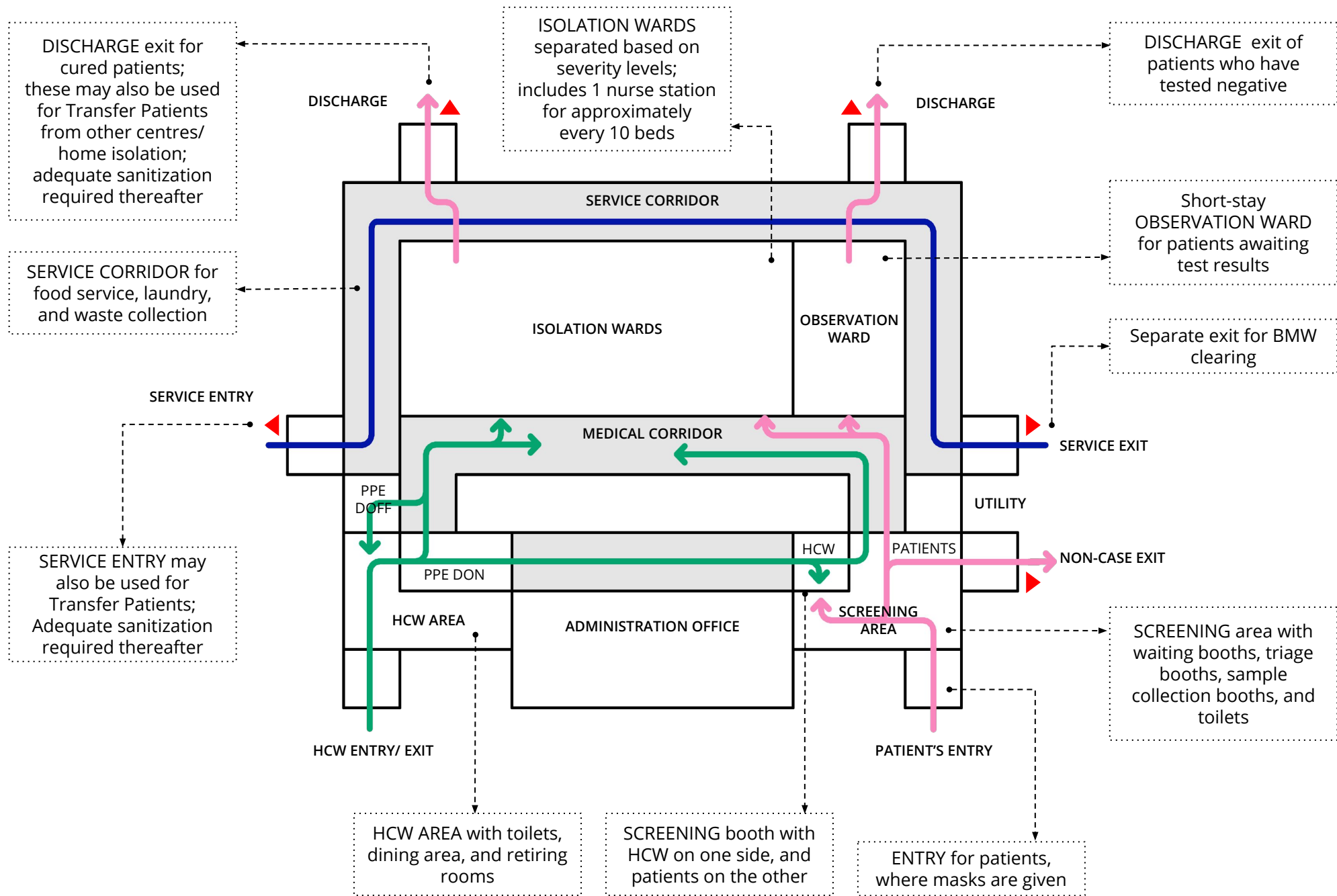


TYPES OF USERS

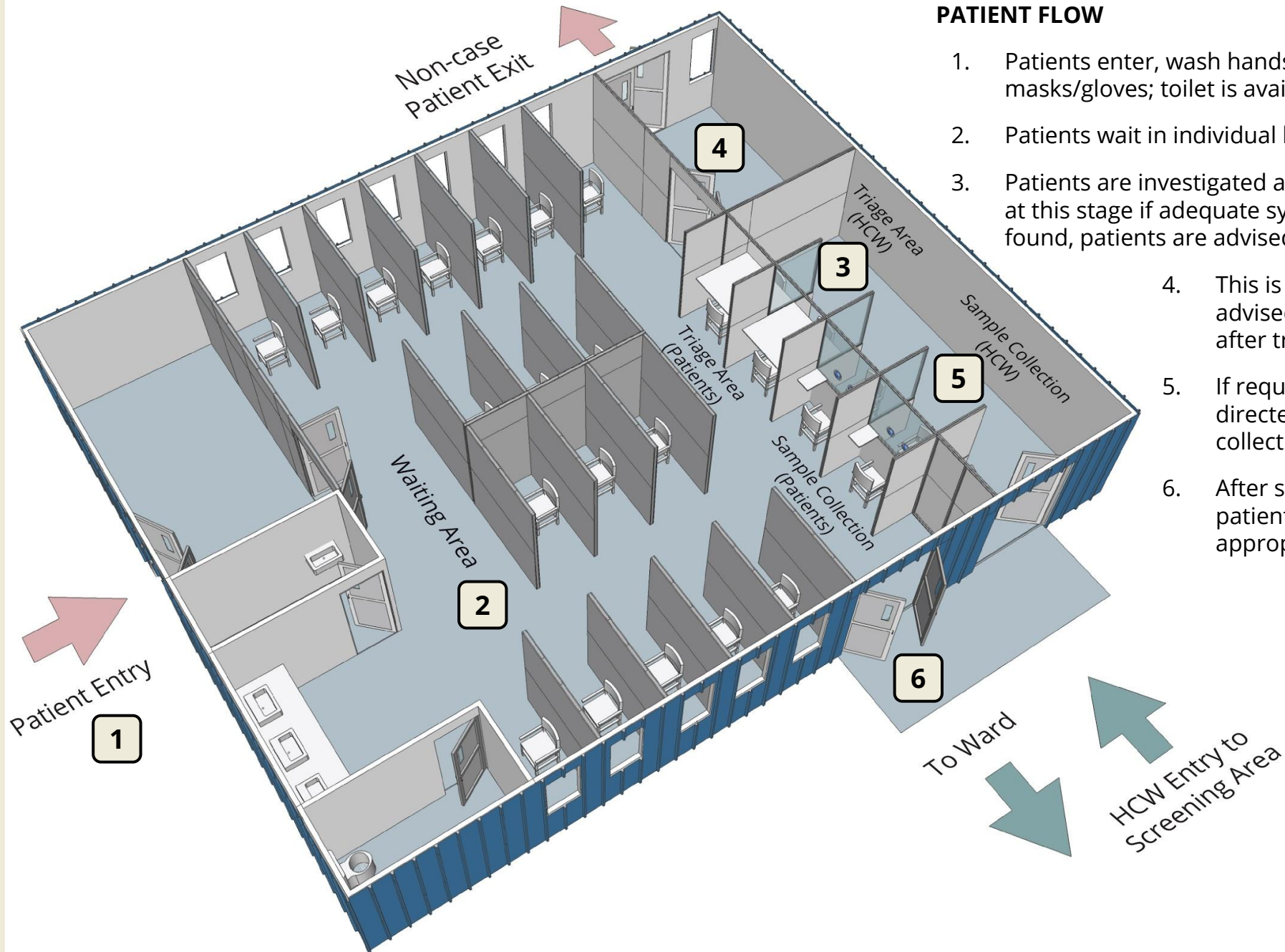
- Service Staff
- Patients
- HCW

2.2

Description of areas



2.3 Details of waiting and screening areas



PATIENT FLOW

1. Patients enter, wash hands and are provided masks/gloves; toilet is available here.
2. Patients wait in individual booths.
3. Patients are investigated at the triage area; at this stage if adequate symptoms are not found, patients are advised to go home.
4. This is the patient exit if advised to go home after triage.
5. If required, patients are directed to the sample collection booth.
6. After sample collection, patients are sent to appropriate wards.

2.4 Area requirements (1/2)

Space	For 20-bed facility	For 50-bed facility	For 100-bed facility
A. Screening Area	70	100	140
Patient's Entry, Waiting, Triage, Sample Collection, Toilets, Non-Case Patient Exit	Triage: 2 Sample Collection: 1 Waiting: 10	Triage: 3 Sample Collection: 2 Waiting: 20	Triage: 6 Sample Collection: 4 Waiting: 30
B. HCW Area	85	110	190
HCW Entry-Exit, Control Room, Incharge Room, Pharmacy, Store, Retiring Rooms, Staff Dining, PPE Don, Dousing Tunnel, PPE Doff, Toilets	HCW staff: 5-6	HCW staff: 10-12	HCW staff: 15-20
C. Service Areas & Utilities	60	90	155
Service Staff Entry-Exit, PPE Don, Pantry, Store, Dousing Tunnel, PPE Doff, Toilet Block, Laundry Collection, BMW Collection, SW Collection	Service Staff: 4-5	Service Staff: 8-10	Service Staff: 15-20
Sub-total D (A + B + C)	215	300	485

Sizes are approximate and in sqm.

2.4 Area requirements (2/2)

Space	For 20-bed facility	For 50-bed facility	For 100-bed facility
E. Wards	285	750	1,465
<p>Observation Ward, Isolation Ward Type 1, Type 2, Type 3, Ward Corridor, Nurse Station, Common Toilets, Discharge Room, Common Room</p> <p><u>Area per bed in each ward including corridors*</u></p> <ul style="list-style-type: none"> • Observation Ward: 9 sqm/ bed (6 for room, 3 for corridor) • Isolation Type 1 Ward: 9 sqm/ bed (6 for room, 3 for corridor) • Isolation Type 2 Ward: 13.5 sqm/ bed (9 for room, 4.5 for corridor) • Isolation Type 3 Ward: 27 sqm/ bed (18 for room, 9 for corridor) 	<p>Observation: 2 beds Iso. Type 1: 10 beds Iso. Type 2: 8 beds Iso. Type 3: None</p>	<p>Observation: 10 beds Iso. Type 1: 20 beds Iso. Type 2: 15 beds Iso. Type 3: 5 beds</p>	<p>Observation: 20 beds Iso. Type 1: 40 beds Iso. Type 2: 30 beds Iso. Type 3: 10 beds</p>
Sub-total F (D + E)	500	1,050	1,950
G. Corridors	175	300	400
Medical Corridor, Service Corridor, Vestibule Corridor: 1.5 m for single-side loading, 1.8-2.1 m for double-side loading			
Grand Total (F + G)	675	1,350	2,350

*Isolation Type 1: Ward with individual enclosed rooms; Isolation Type 2: Type 1 along with individual toilets; Isolation Type 3: Type 2 along with containment anteroom for every room.

Sizes are approximate and in sqm.

See [Annex 2](#) for detailed Schedule of Rooms

Part 3:

Layouts for Different Site Typologies

- 3.1 Layout for an open ground or a large covered hall
- 3.2 Layout for a building without an open ground
- 3.3 Layout for a building with an open ground
- 3.4 Layouts for railway stations

3.1

Layout for an open ground or a large covered hall (1/2)



All dimensions in metres

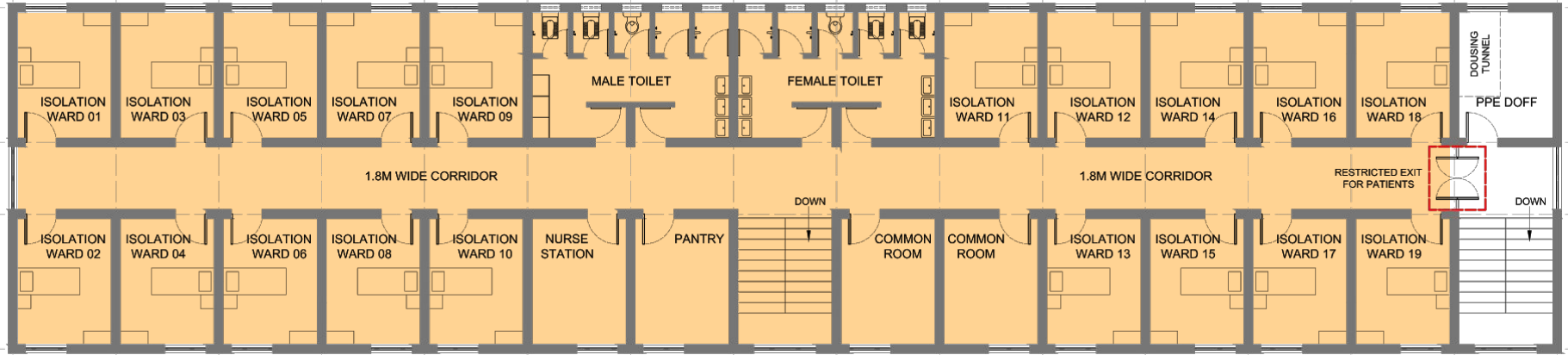
3.1

Layout for an open ground or a large covered hall (2/2)

Notes

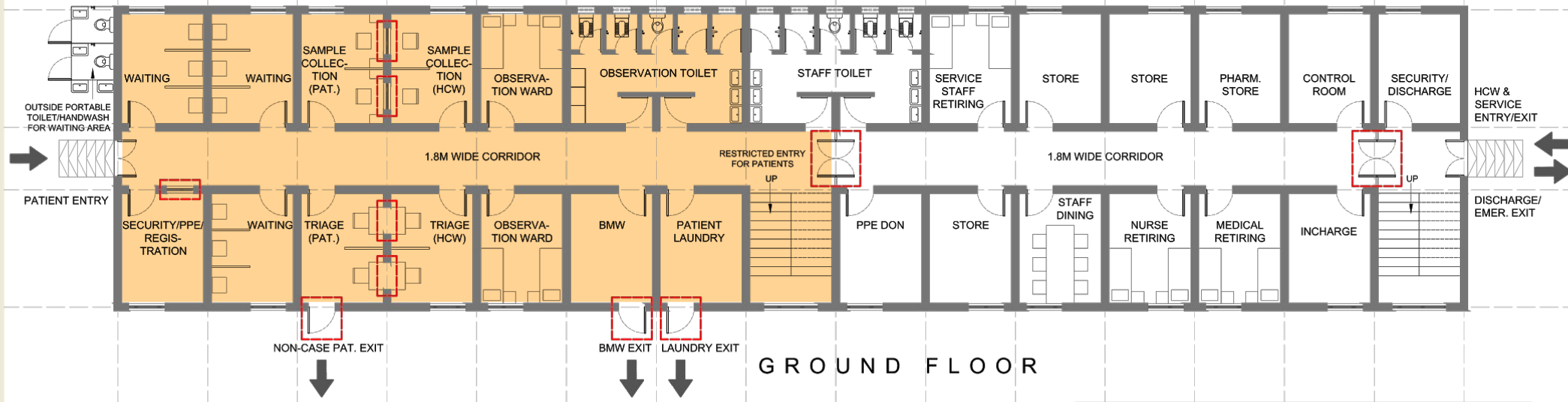
- The design illustrates **three (3)** types of wards for increasing severity of symptoms:
 - Type 1: Ward with individual enclosed rooms
 - Type 2: Type 1 along with individual toilets
 - Type 3: Type 2 along with containment anteroom for every room
- Concerned authorities may choose most suitable combination of wards as per local requirements.
- Kitchen has not been provided, as it is recommended that food to be cooked off-site, and that disposable crockery and cutlery be used within the facility to avoid associated risks.
- Space has been provisioned for Dousing Tunnels where required. Installation of such tunnels is subject to identification and approval of safe dousing methods, as per advisories of authorities.

Layout for a building without an open ground (1/2)

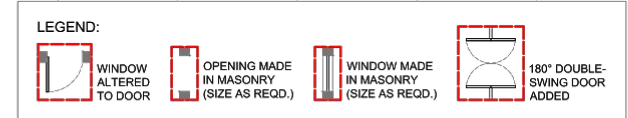


FIRST FLOOR

HCW PPE AREA



GROUND FLOOR



3.2

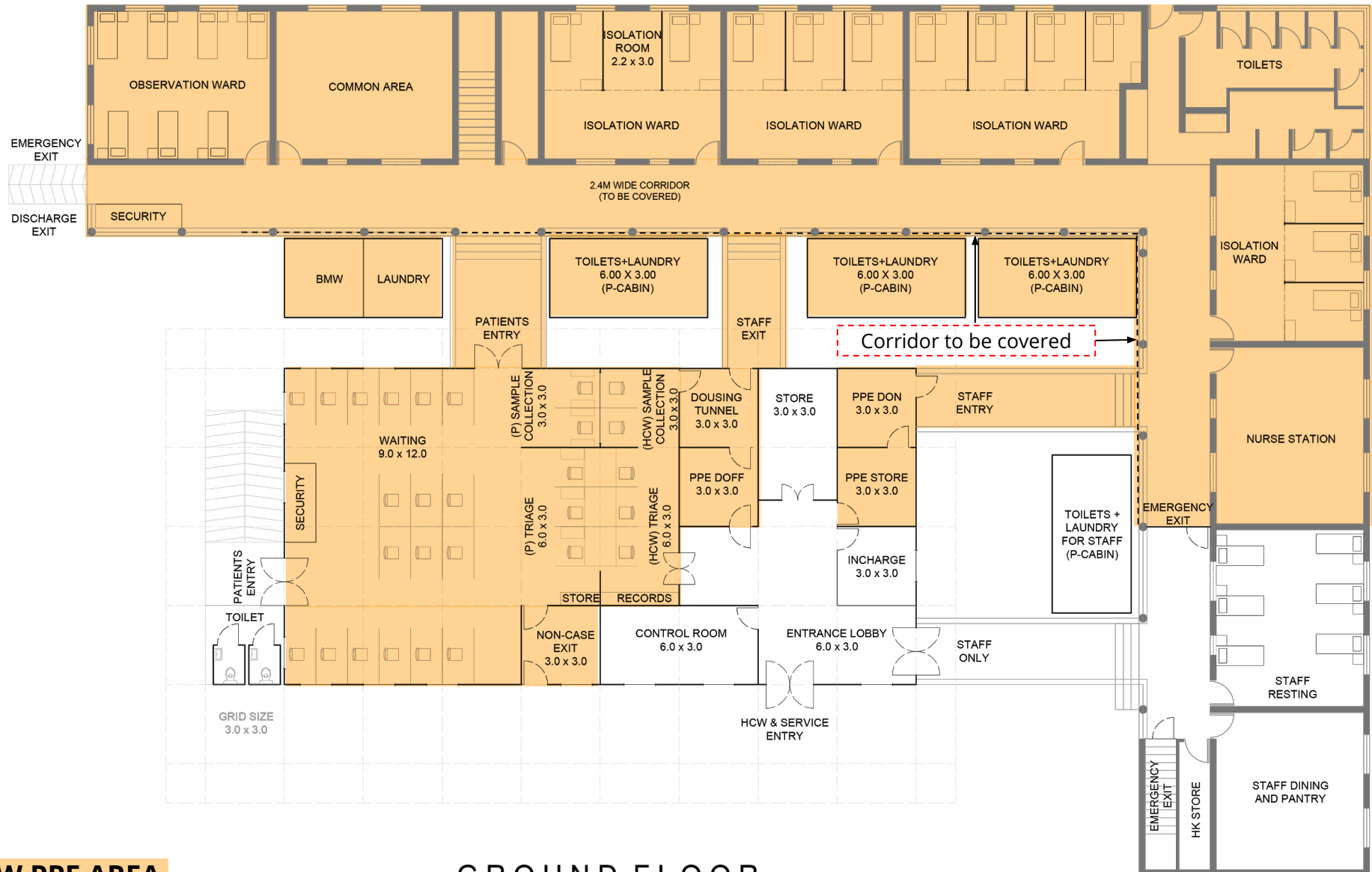
Layout for a building without an open ground (2/2)

Notes

- A building can be adapted to a screening-cum-isolation facility **only** when certain small civil works/changes are possible. Without such changes, such facilities can work as isolation wards only.
- Only hostels/dharamshalas/hotels with **two staircases** can be reorganized as isolation facilities:
 - With two staircases, PPE donning and doffing can be managed in a functional way, without moving across different risk zones.
 - PPE donning and doffing will be on the ground and first floors, respectively.
- It is recommended that the staff and service areas be organized on the lower floor, that is a medium to low-risk zone, while isolation wards/rooms be planned exclusively on separate upper floors.
- On the ground floor, **ten to twelve (10-12) rooms** are required to cover all the patient, medical and staff functions.
- Kitchen has not been provided, as it is recommended that food to be cooked off-site, and that disposable crockery and cutlery be used within the facility to avoid associated risks.
- Space has been provisioned for Dousing Tunnels where required. Installation of such tunnels is subject to identification and approval of safe dousing methods, as per advisories of authorities.

3.3

Layout for a building with an open ground (1/3)

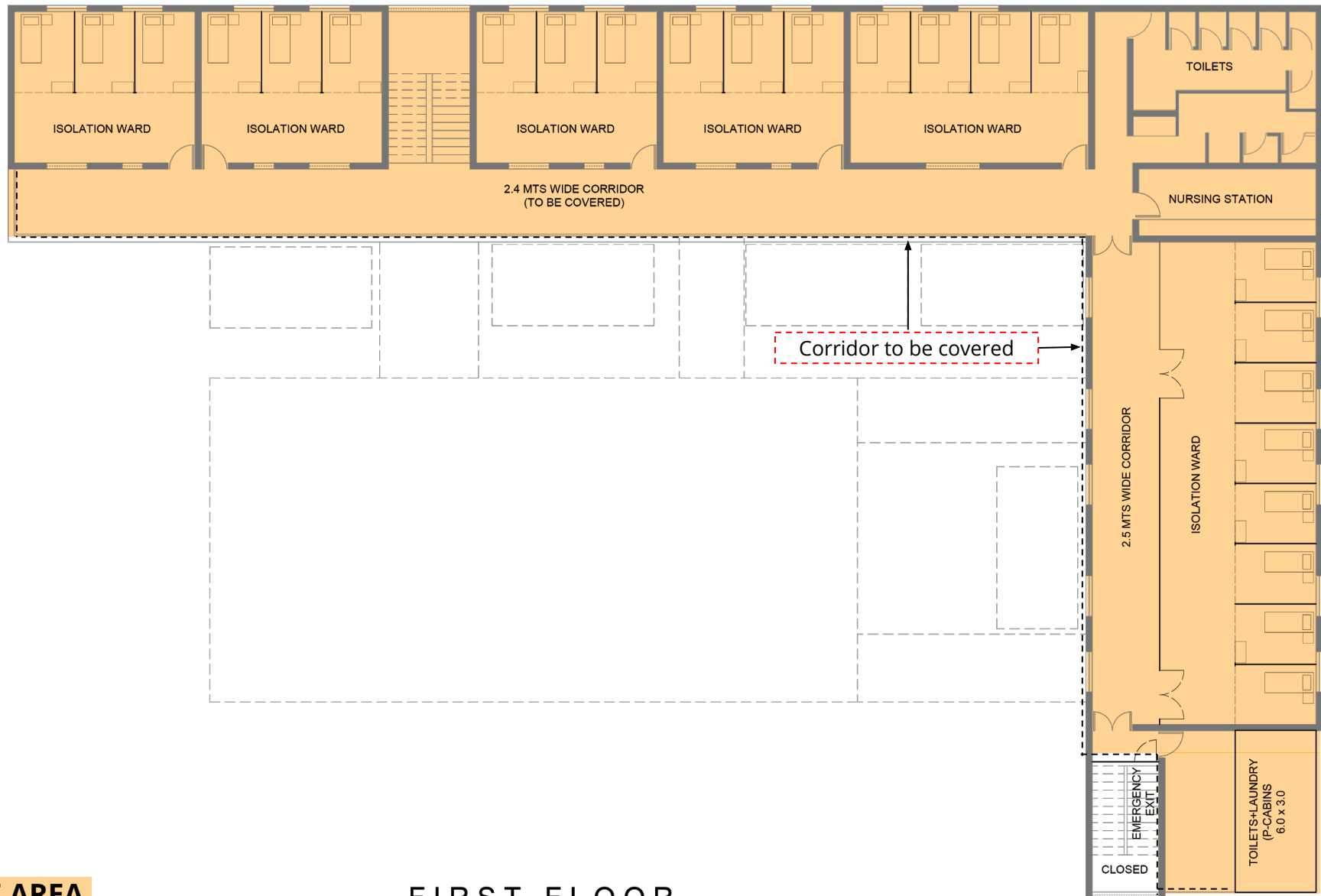


HCW PPE AREA

GROUND FLOOR

3.3

Layout for a building with an open ground (2/3)



HCW PPE AREA

FIRST FLOOR

3.3

Layout for a building with an open ground (3/3)

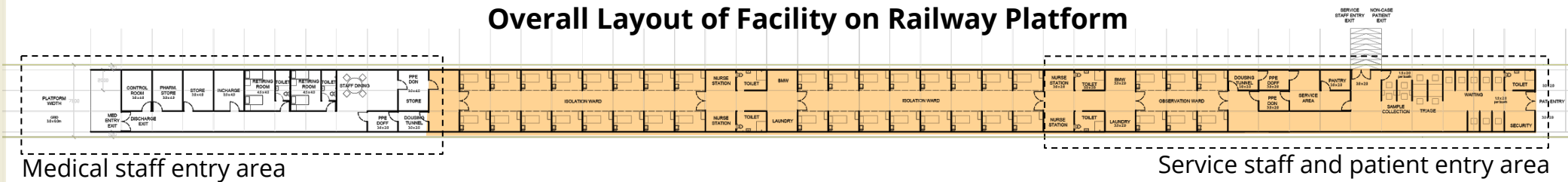
Notes

- It is recommended to use the building for isolation wards/rooms, and the open ground for all other functions, including screening.
- Moderate cases to be accommodated on the ground floor, in proximity to the nurse station and exit point of the facility.
- Open corridor spaces should be covered on the sides with plastic sheets, waterproof tarpaulin, or other such material.
- Areas with different risk levels must not be along the same corridor, and these may be blocked as required.
- In case of shortage of toilets in the facility, portable toilet cabins can be installed on the terraces.
- Kitchen has not been provided, as it is recommended that food to be cooked off-site, and that disposable crockery and cutlery be used within the facility to avoid associated risks.
- Space has been provisioned for Dousing Tunnels where required. Installation of such tunnels is subject to identification and approval of safe dousing methods, as per advisories of authorities.

3.4

Layouts for railway stations: Using platform only (1/3)

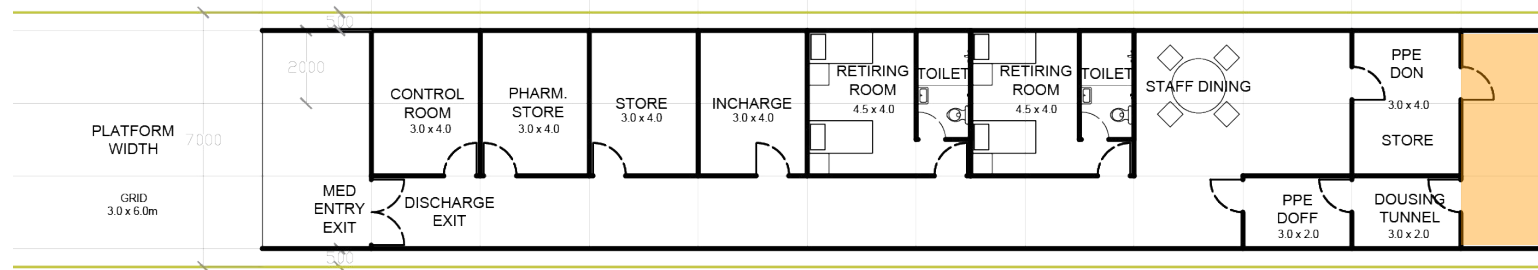
Overall Layout of Facility on Railway Platform



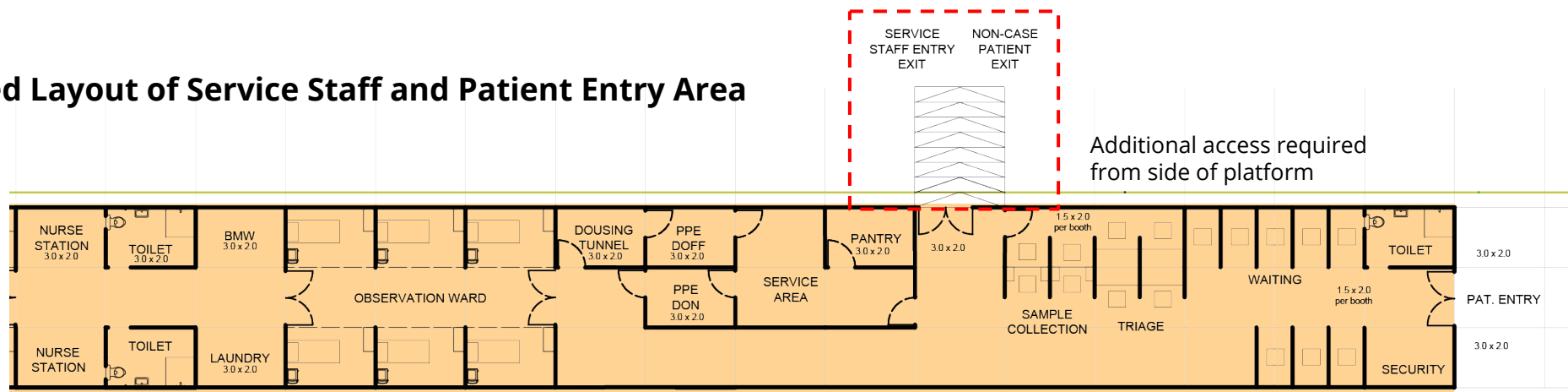
Medical staff entry area

Service staff and patient entry area

Detailed Layout of Medical Staff Entry Area



Detailed Layout of Service Staff and Patient Entry Area

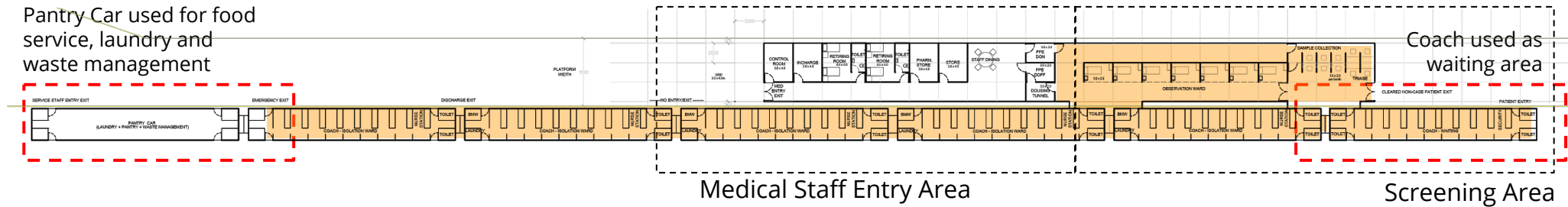


HCW PPE AREA

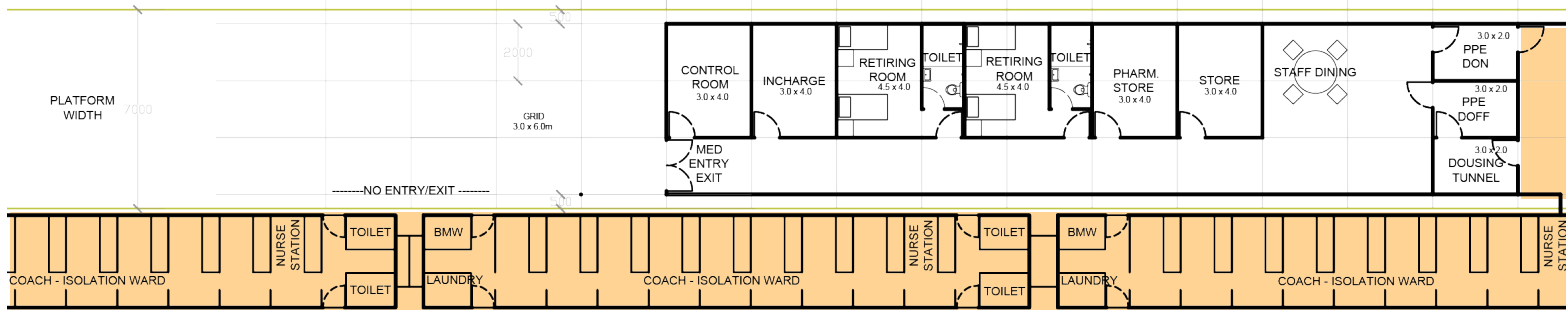
3.4

Layouts for railway stations: With platform and coaches (2/3)

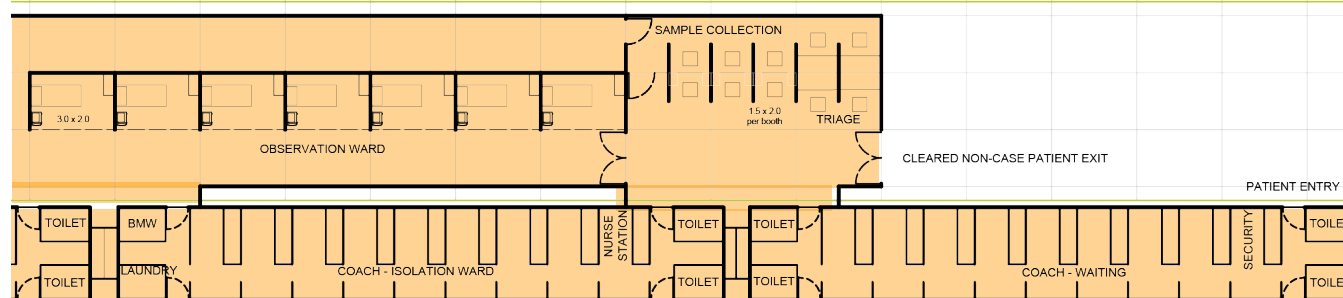
Overall Layout of Isolation Facility on Railway Platform using Coaches as Wards and Pantry Car for Services



Detailed Layout of Medical Staff Entry Area



Detailed Layout of Screening Area



HCW PPE AREA

3.4

Layouts for railway stations (3/3)

Notes

- Two options for layouts have been provided for railway stations:
 - Platform used for all functions; This layout requires a third entry/exit point for food service, laundry, waste and BMW.
 - Parked railway coaches used as isolation wards only, a pantry car used for cooked food service, laundry, waste management and housekeeping, and platform used for all other functions.
- The end-of-platform ramp to be used for vehicular access for patients and service staff, when required.
- Obstructions on the platform such as electric poles/boxes, benches, toilets, tree/planters to be considered when choosing and repurposing the station.
- It is recommended to undertake construction in the open areas of the station, that are not covered by the station roof or shed.
- It is recommended that disposable crockery and cutlery be used within the facility to avoid associated risks.
- Space has been provisioned for Dousing Tunnels where required. Installation of such tunnels is subject to identification and approval of safe dousing methods, as per advisories of authorities.

Part 4:

Materials and Construction Systems

- 4.1 Criteria for selecting construction systems
- 4.2 Applicability of recommended construction systems
- 4.3 Details of recommended construction systems
 - 4.3.1 Construction system 1: On-site fabrication on open ground
 - 4.3.2 Construction system 2: Porta-cabins on open ground
 - 4.3.3 Functional requirements

4.1

Criteria for selecting construction systems

1 Quick to construct, dismantle and cost-effective

2 Likely to be locally available, or easy to transport, if not locally available

3 Labour should be locally available

4 Fire resistant

5 Weather-proof and ease of infestation control

Notes

- Construction systems recommended in these guidelines fulfill all the above criteria to the best of our knowledge.
- If some recommended materials are not available, concerned authorities are advised to choose substitutes that fulfill the above criteria as far as possible.

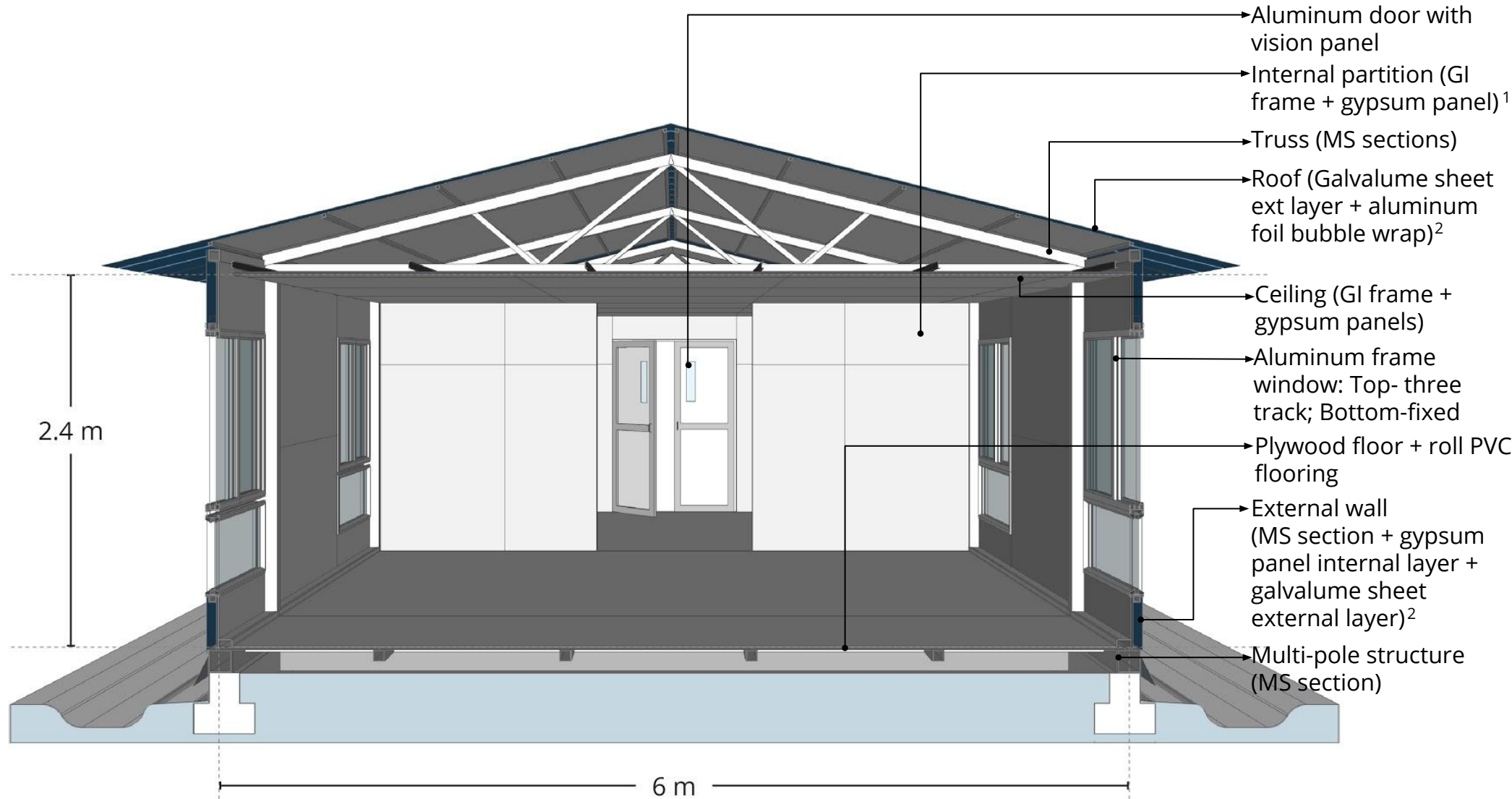
4.2

Applicability of recommended construction systems

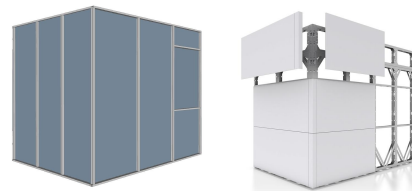
<p>Typologies</p> <p>Construction systems</p>	<p>Built-up plinths, platforms, cemented & other grounds</p>	<p>Large halls with roofs</p>	<p>Places with independent set of rooms</p>
<p>System 1: On-site fabrication</p>	<p>Fully applicable</p>	<p>Only internal partitions</p>	<p>Applicable if open ground is available. Otherwise, use internal partitions</p>
<p>System 2: Porta-cabins</p>	<p>Fully applicable</p>	<p>NA</p>	<p>Applicable if open ground is available</p>

4.3.1

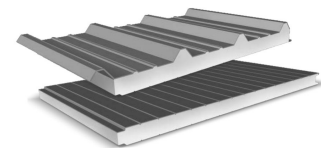
Construction system 1: On-site fabrication on open ground (1/6)



¹ (or) Aluminium section partitions with prelam board (or) Octanorm

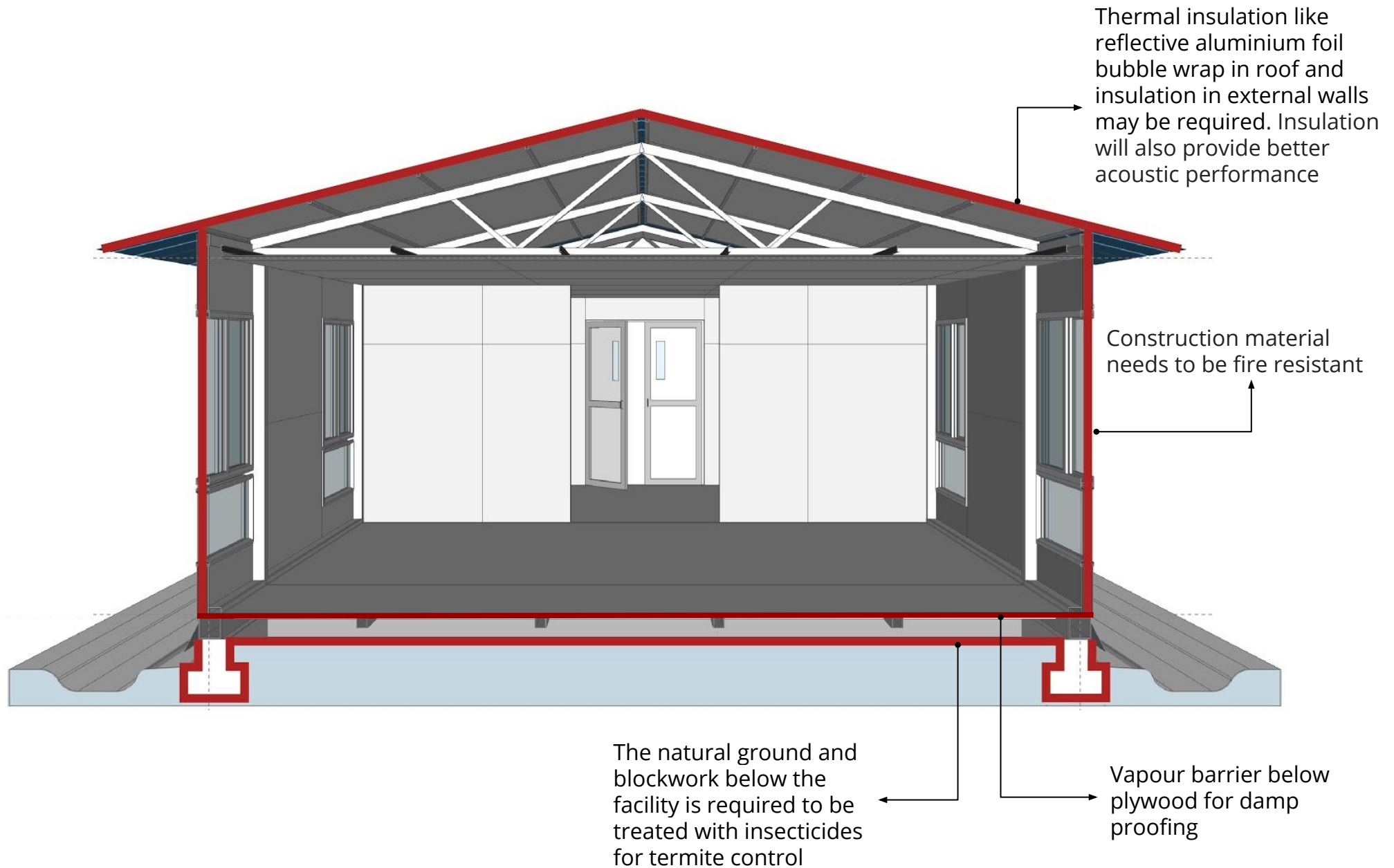


² (or) Insulated fire-resistant sandwich panels with pre painted Galvanized Iron (GI) sheet on both sides



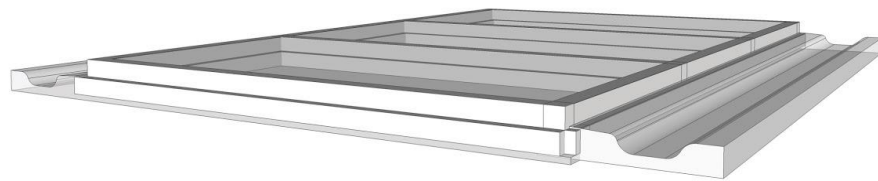
4.3.1

Construction system 1: On-site fabrication on open ground (2/6)



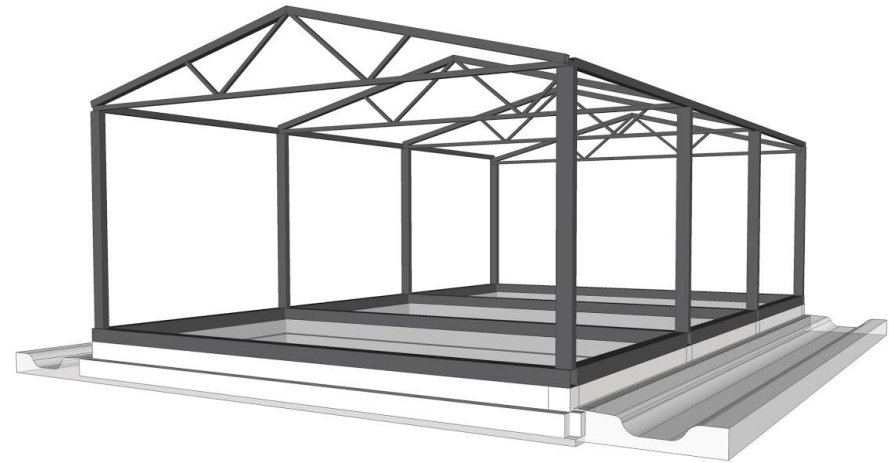
4.3.1

Construction system 1: On-site fabrication on open ground (3/6)



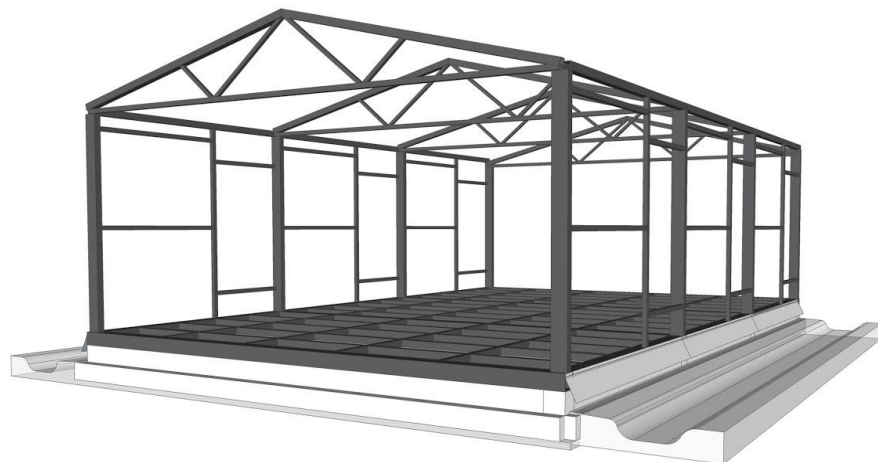
1

Footing with 0.3m deep blockwork on 6m x 3m grid; rammed earth filling upto footing level



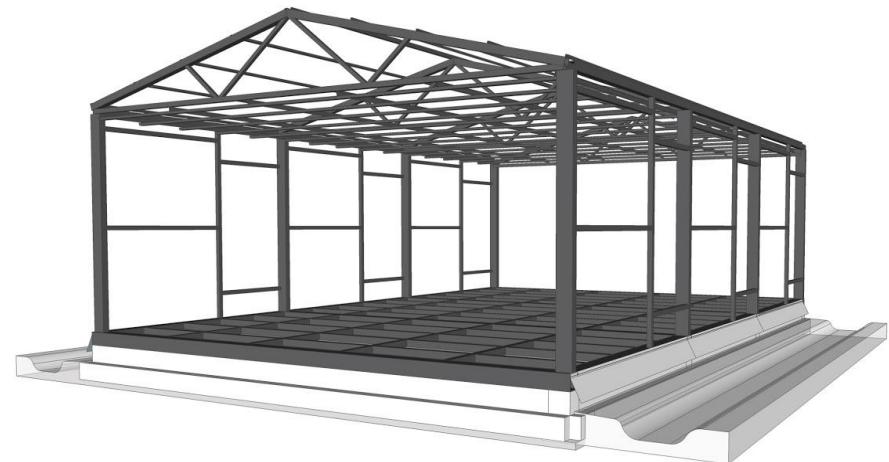
2

Multipole structure with tie beam and truss along 6m x 3m modules; MS sections used



3

Secondary grid for wall and floor with MS sections



4

Ceiling grid with GI sections; MS section purlins

4.3.1

Construction system 1: On-site fabrication on open ground (4/6)



5

External wall with dual layer of galvalume sheet and gypsum board; roof with galvalume sheet with aluminum foil bubble wrap



6

Plywood floor; gypsum board false ceiling



7

Roll PVC flooring over plywood floor; framework for internal partitions with GI sections

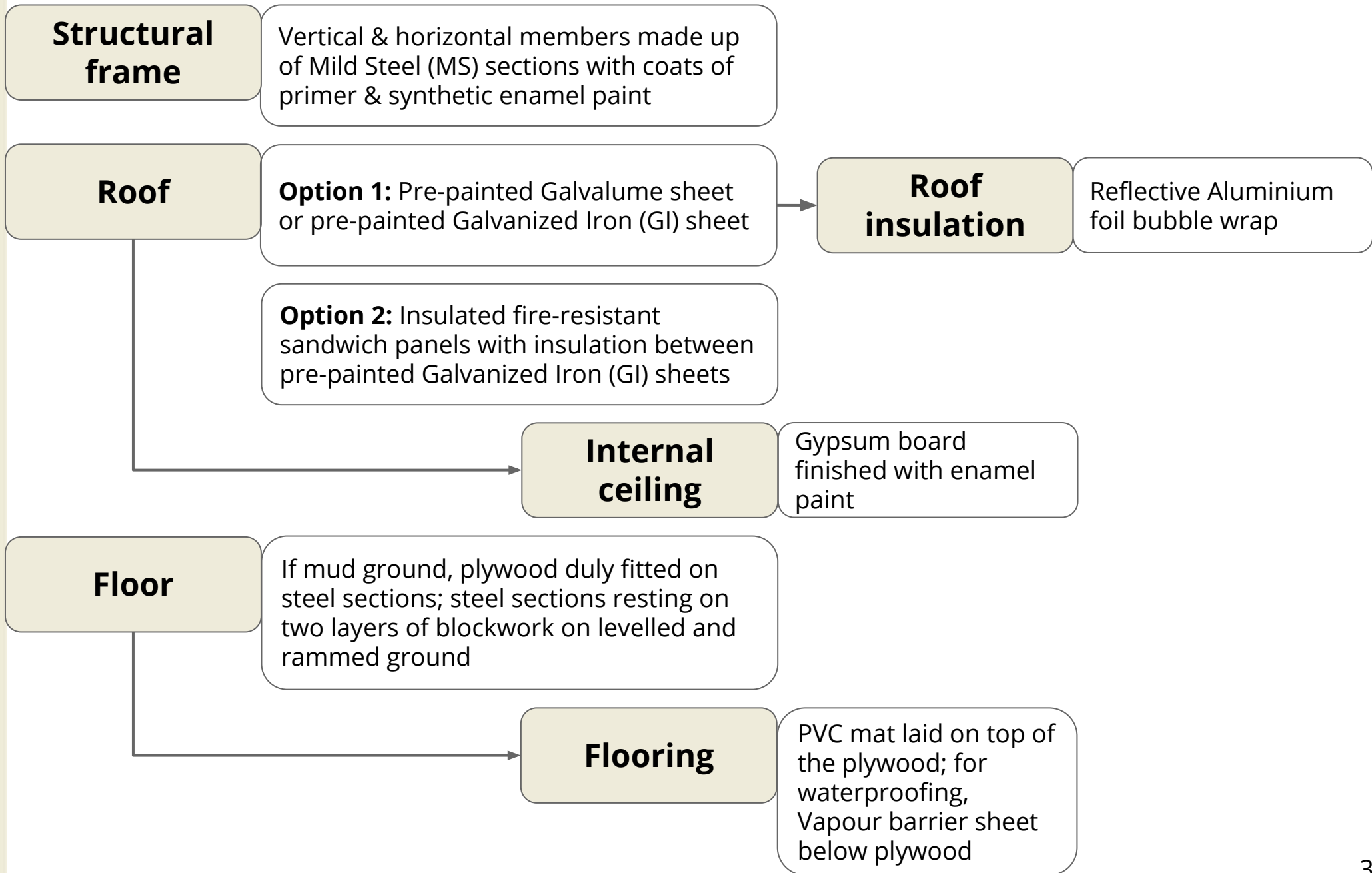


8

Panelling for internal partitions with gypsum board on both sides of GI framework

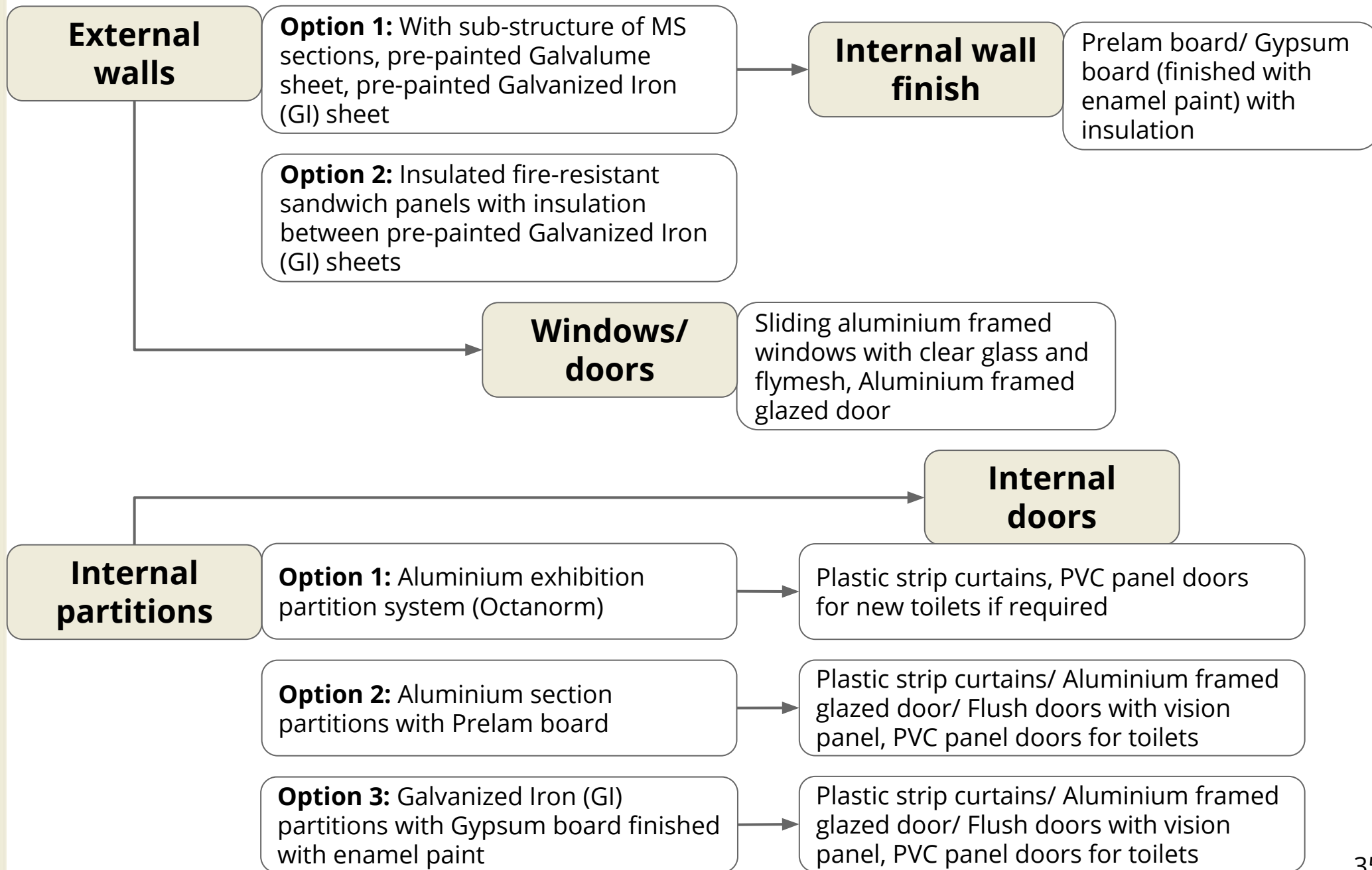
4.3.1

Construction system 1: On-site fabrication on open ground (5/6)



4.3.1

Construction system 1: On-site fabrication on open ground (6/6)



4.3.2

Construction system 2: Porta-cabins on open ground

About Porta-cabins

Porta-cabins may be explored as an alternative if readily available on low price or on rent. They can be placed together to form an isolation facility.

Advantages

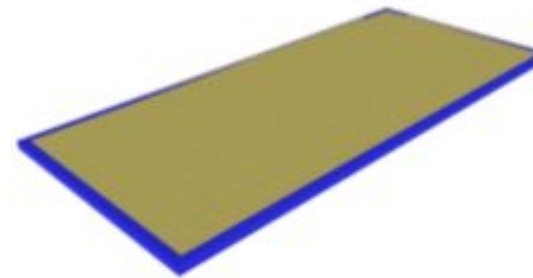
- Fast assembly
- Modularity, flexibility and availability in various sizes
- Safe and durable, weather proof and resistant to disaster
- Equipped with basic services like toilet, electrical wiring, sockets, lighting
- Mobile and transportable

Examples:

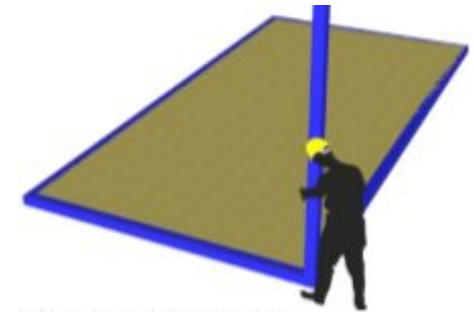
<https://www.epack.in>

<https://www.samanportable.com>

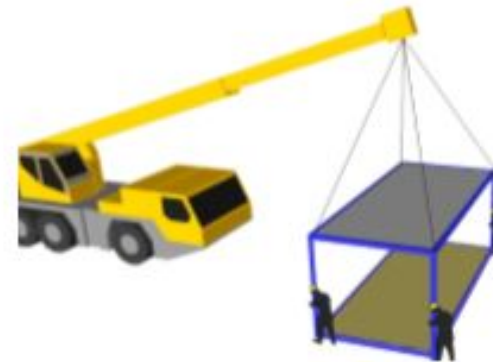
<http://arportablecabins.com>



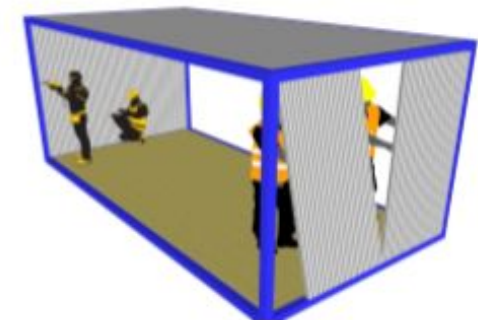
1. Bottom Frame Installation



2. Corner Posts Installation



3. Roof Installation with Crane, Chain Pulley etc.



4. Wall Panel Installation



5. Services Installation



6. Ready to Use

4.3.3

Functional requirements

Furniture & fittings

- Beds, tables, chairs and storage (easy-to-sanitize)
- Hospital design sanitary fittings ([elbow-operated taps](#), scrub sinks, Indian & Western pan WCs, [grab bars](#), etc.)
- Minimum-touch and simple door/window knobs & handles

Power & illumination

- UPS to power essentials including emergency lighting
- Estimated total load: 1 kW per bed
- Recommended light level: 300 lux

Mechanical ventilation

- Exhaust fans and fresh air fans on external walls to work in tandem for ventilation
- Pedestal/ceiling fans for internal air movement
- For dust control, air curtains may be installed at all the entries, as well as between different zones of the facility.

Universal access

- If existing building then, temporary ramps of wood/MS frame and plywood to take care of ground floor
- Maintain corridor width at 1.8 m, including on ramps for toilets and plinths

Ceiling & flooring

- If existing building has a high roof, a ceiling may be required in clinical/ isolation areas, to be anchored on the internal partition system
- If existing building or ground with cemented floor then, vinyl flooring to be added

Part 5: Setting up Water and Sanitation Infrastructure

- 5.1 Overview
- 5.2 Water supply
- 5.3 Toilets
- 5.4 Containment
- 5.5 Treatment

Water supply

Water requirement in isolation and treatment facilities is significant

Supply

- Existing borewell or govt. supply; Tankers
- New borewell

Storage

- Storage: local elevated storage tanks; with,
- Size based on number of beds (200 L per bed) and frequency of supply*:
25 beds → 5,000 L
50 beds → 10,000 L
100 beds → 20,000 L

Treatment

- Treatment up to IS 10500 : 2012

** Requirement based on average of NBC and SPHERE standards; storage: based on daily supply*

Toilets and containment

Use existing toilets and bathrooms wherever possible, else consider portable booths and e-toilets/portable green toilets

Toilets

- Use porta-cabin toilets as required and feasible
- When constructing on site, toilets should be mounted on stable structures; Trenching and piping for constructed toilets to be completed before construction of structures

Containment

- Option 1: Construct twin-pit containment units, clubbing a battery of toilets*
- Option 2: Construct scientific septic tank with overflow and digester area

** Advantage of local familiarity with system due to Swachh Bharat Mission*

Treatment and disposal

There is yet no evidence that Covid-19 spreads through fecal matter

Treatment

- Ideal option is to connect toilets to existing sewerage system connected to an STP
- Else, consider a decentralized system consisting of DEWATS, planted gravel filter, polishing tank and chlorination system*

Disposal

- In case of twin-pit or septic tank without overflow, desludging is required as per the containment volume
- If using porta-cabin toilets, consider regular removal of fecal sludge and cleaning

** Chlorination highly recommended for final decontamination*

5.2

Water supply (on-site construction if Govt. supply not available)



Key considerations

Treatment

- Detailed IS 10500 : 2012 standards can be found at <https://tinyurl.com/biscgwbwq>
- An easy reference guide for treatment practices can be found at <https://tinyurl.com/is10500>

Storage

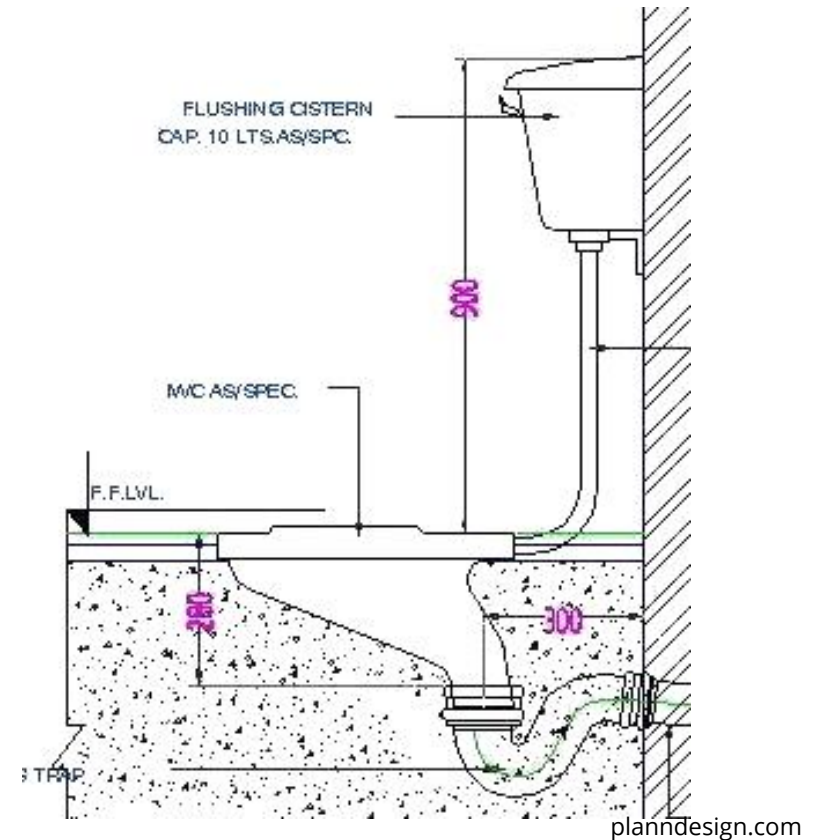
- Easy-to-construct solution for storage may be plastic water tanks of appropriate size on MS towers
- Storage may be centralized on site OR distributed across the site as per requirement and feasibility

Piping to points-of-use

- Standard plumbing practices will need to be followed, in order to prevent leakage and for ease of maintenance
- This may include trenching to points-of-use, which will need to be done before the construction of the facility
- As this is a temporary facility, consider the ease of removal of all plumbing once the facility is closed

5.3

Toilets (portable and on-site construction options)



Portable toilets

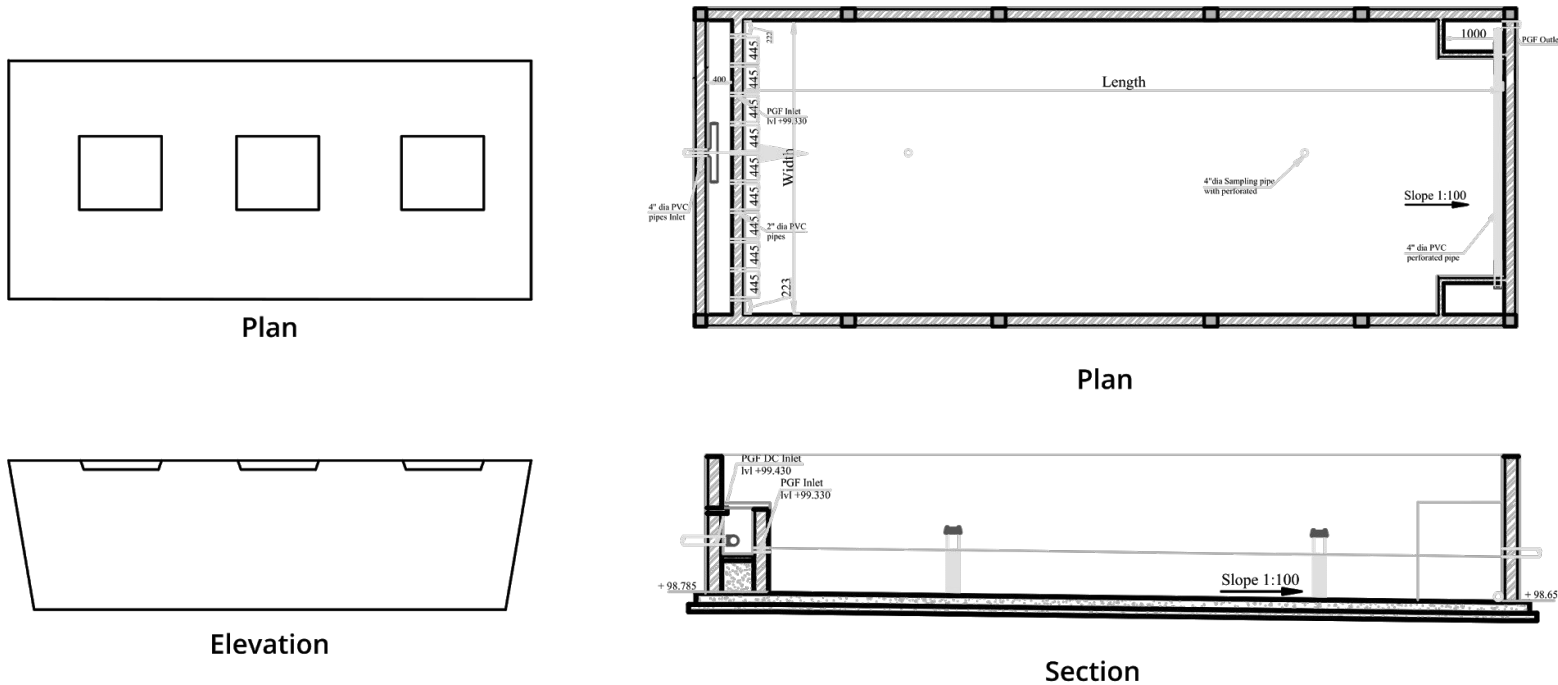
Manufacturers (more may be available locally)

- <https://tinyurl.com/superloo>
- <https://tinyurl.com/ascenttoilet>
- <https://tinyurl.com/fibroltoilet>
- <https://tinyurl.com/sintextoilet>

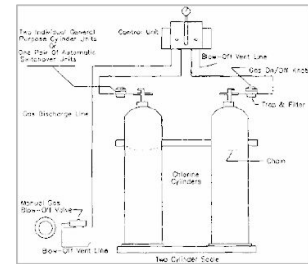
On-site constructed toilets

Key Considerations

- To install Indian (or Western) WCs, the plinth will need to be raised by 450 mm (minimum 400 mm)
- The outlet soil-water pipe will need to be punched through the external wall and cladding



Recommended plants:
1. Canna Indica
2. Cyperus Papyrus



DEWATS



Planted Gravel Filter Bed



Chlorination Tank

IIHS

Decentralized Wastewater Treatment System

Key Considerations

- Wastewater from toilets and other selected areas may be piped to a DEWATS (Decentralized Wastewater Treatment System); This can be constructed on site or a prefabricated one ordered from www.cddindia.org
- A Planted Gravel Filter Bed (PGF) will also need to be constructed as per the suggested layout on this page
- Since some of the water may still have contaminants, it is recommended to conduct chlorination through a scientific method; The description of a chlorination method can be found at <https://tinyurl.com/oaschlor>

References

- [MoHFW, 'Advisory for Hospitals and Medical Education Institutions'](#)
- [MoHFW, 'Advisory for quarantine of migrant workers'](#)
- [MoHFW, 'Advisory on social distancing'](#)
- [MoHFW, 'Guidance document on appropriate management of suspect/confirmed cases of COVID-19'](#)
- [MoHFW, 'Guidelines for screening centres and isolation facilities in hospitals'](#)
- [MoHFW, 'How to manage suspected or confirmed patients with COVID-19 at designated hospital'](#)
- [MoHFW, 'National guidelines for infection prevention and control in healthcare facilities'](#)
- [MoHFW, 'Revised Guidelines on Clinical Management of COVID-19'](#)
- [NCDC, 'Guidelines for quarantine facilities COVID-19'](#)
- [NCDC, 'Guidelines for setting up isolation facility/ward'](#)
- [WHO, 'Infection prevention and control during health care when novel coronavirus \(nCoV\) infection is suspected'](#)
- [WHO, 'Severe Acute Respiratory Infections Treatment Centre'](#)
- [WHO, 'Water, sanitation, hygiene and waste management for COVID-19'](#)

Annexes

Annex 1 Site Assessment Checklist

Annex 2 Schedule of Rooms

Annex 1

Site Assessment Checklist (1/3)

ABOUT BUILDING			
Name & address of building: _____			
Total built-up area: _____sqm		Total open ground available: _____sqm	
CHECKLIST FOR SELECTION			
S. NO.	CRITERIA A: HIGH PRIORITY (Selected site must meet all)	RESULT	REQUIREMENTS
	SITE AND STRUCTURAL FEATURES		
1	Road connectivity	No road / Pukka road / Katcha road	All-weather road access to site
2	In low-lying or flood-prone area	Yes / No	Leveling may be required if area is flood-prone or undulating
3	Buffer zone between site and residential area	Distance from closest residential area: _____km	Adequate distance from inhabited area to allow for natural ventilation and dispersion of exhaust air from facility
4	Proximity to COVID-19 hospitals	Distance from closest COVID-19 hospital: _____km	Reasonable distance from COVID-19 hospitals to transfer deteriorating cases
5	No of rooms available for <u>clinical & support</u> functions <u>OR</u> Open ground available for <u>clinical & support</u> functions	Total no of rooms in building: _____ <u>OR</u> Open ground available: _____sqm	Areas required: <ul style="list-style-type: none"> ● In existing building, 10 rooms + corridors ● If open ground has to be used, then minimum area (excluding corridors): <ul style="list-style-type: none"> ○ For 20 beds, 215 sqm ○ For 50 beds, 300 sqm ○ For 100 beds, 485 sqm

Annex 1

Site Assessment Checklist (2/3)

S. NO.	CRITERIA A: HIGH PRIORITY (Selected site must meet all)	RESULT	REQUIREMENTS
6	Area for observation and isolation wards	No of rooms available: _____ <u>OR</u> Open ground available: _____sqm	<ul style="list-style-type: none"> In existing building: <ul style="list-style-type: none"> Single room: 9 sqm Multi-bed shared room: 7.5 sqm per bed. If open ground has to be used: <ul style="list-style-type: none"> For 20 beds, 285 sqm For 50 beds, 750 sqm For 100 beds, 1,465 sqm
7	Sufficient width of doors	Width of doors: _____meters	<ul style="list-style-type: none"> General door width: 0.9 clear opening Toilet door width: 0.6 m clear opening
8	Entries/Exits to the building	No of entry/exit points: _____	<ul style="list-style-type: none"> Entry/exits required for patients: 1 each for Entry, Non-case exit & Discharge For staff: 1 for HCW & 1 for Service (may be combined if required)
BASIC SERVICE INFRASTRUCTURE			
9	Availability of power	Yes / No	Load requirement: 1 kW per bed
10	Presence of fire prevention measures	Mention measures taken: <ul style="list-style-type: none"> • _____ • _____ 	<ul style="list-style-type: none"> Proximity to fire station Availability of fire-fighting equipment on-site
11	Connection to government water supply and sewerage system <u>OR</u> Area available on-site for water tanks, and septic tank/twin-pit system for containment	Yes / No <u>OR</u> Area available for on-site containment: Yes / No	<ul style="list-style-type: none"> Ideal to have government water and sewerage network connection If local provision, then about 30-40 sqm ground area required for water tanks and septage containment

Annex 1

Site Assessment Checklist (3/3)

S.NO.	CRITERIA A: HIGH PRIORITY (Selected site must meet all)	RESULT	REQUIREMENTS
12	Availability of toilets <u>OR</u> Area available for portable/prefabricated toilets	No. of toilets: _____ <u>OR</u> Area available for portable toilets: Yes / No	<ul style="list-style-type: none"> Toilets required: <ul style="list-style-type: none"> Obs. ward: 2 toilets per 10 patients Iso. wards (mild): 2 toilets per 10 patients Iso. wards (moderate): ideally, 1 toilet per patient 2 toilets each for HCW and service staff
.	CRITERIA B (Selected site should meet, if possible)	RESULT	REQUIREMENTS
13	Accommodation for staff and attendants	Types of accommodation available in proximity: _____ _____	<ul style="list-style-type: none"> Availability of accommodation such as hotels, hostels, <i>dharamshalas</i>, night shelters, etc., in the near vicinity will be an advantage
14	Access ramps	Yes / No <u>OR</u> Space available to make	<ul style="list-style-type: none"> Appropriate ramps for wheelchairs, trolleys, stretchers, etc., will be an advantage
15	Open ground to expand facility	Area available: _____sqm	<ul style="list-style-type: none"> Ability to expand the facility in the future will be an advantage
16	Presence of security features	Yes / No	<ul style="list-style-type: none"> Compound wall Security cabin/area
17	Space for parking	Yes / No	<ul style="list-style-type: none"> Adequate parking for ambulances and staff vehicles If possible, proximate helipad

Annex 2

Schedule of Rooms (1/6)

SCREENING AREAS				
ROOM/ FUNCTION	ACCESS FROM	AREA REQUIRED	VENTILATION	NOTES
Patient Entry	-Outside	6-10 sqm	Hybrid	<ul style="list-style-type: none"> - Direct vehicular access - Security personnel desk for registration - PPE disbursement - PPE Store
Waiting Area	-Patient Entry	2 sqm/patient	Hybrid	<ul style="list-style-type: none"> - Seating separated by partition for waiting - Equipped with dedicated toilets - 180 degree double Swing Door with air curtain
Triage	-Waiting Area	6 sqm/patient	Hybrid	<ul style="list-style-type: none"> - Individual booths for initial investigation separated by partition maintaining a distance of 1.2m between HCW and patient
Sample Collection	-Triage	4.5 sqm/person	Hybrid	<ul style="list-style-type: none"> - Individual booths for contactless sample collection separated by glass partition between HCW and patient - Shelves towards patient's side for keeping sample - 180 degree double Swing Door with air curtain
Toilet	-Waiting Area	10-15 sqm/ Toilet block	Hybrid	<ul style="list-style-type: none"> - 1 male and 1 female toilet - External area for hand-washing
Non-case Patient Exit	-Triage	6 sqm	Hybrid	<ul style="list-style-type: none"> - Security personnel desk

Mechanical ventilation: Use of powered fans or blowers to provide fresh air to rooms

Hybrid ventilation: Mix of natural and mechanical driving forces

Annex 2

Schedule of Rooms (2/6)

WARDS				
ROOM/ FUNCTION	ACCESS FROM	AREA REQUIRED	VENTILATION	NOTES
Observation Ward	- Medical corridor - Service corridor	9 sqm/bed (6 sqm/room + 3 sqm for corridor)	Hybrid	- Ward for patients awaiting sample results - Circulation around bed from three sides - Provision of enclosing the rooms with air strip curtains - 180 degree double swing door for the ward with air curtain - Common toilet block
Isolation Ward Type 1 : Ward with individual enclosed rooms	- Medical corridor - Service corridor	9 sqm/ bed (6 sqm/room + 3 sqm for corridor)	Hybrid	- Circulation around bed from three sides - Room door with vision panel - 180 degree double swing door for the ward with air curtain - Common toilet block
Isolation Ward Type 2 : Type 1 along with individual toilets	- Medical corridor - Service corridor	13.5 sqm/ bed (9 sqm/room + 4.5 sqm for corridor)	Hybrid	- Circulation around bed from three sides - Room door with vision panel - 180 degree double swing door for the ward with air curtain - Upgradable to Type 3
Isolation Ward Type 3 : Type 2 along with containment anteroom for every room	- Medical corridor - Service corridor	27 sqm/bed (18 sqm/room + 9 sqm for corridor)	Mechanical	- 1m circulation around bed from three sides - Room door with vision panel - 180 degree double swing door for the ward with air curtain

Annex 2

Schedule of Rooms (3/6)

WARDS				
ROOM/ FUNCTION	ACCESS FROM	AREA REQUIRED	VENTILATION	NOTES
Nurse Station	- Observation Ward -Isolation ward	4-10 sqm	Hybrid	- Located at one end of each ward for view and supervision
Common Toilets	-Service corridor -Observation Ward -Isolation ward type 1	10 sqm/toilet block	Hybrid	- Toilets & bathrooms (M & F) for observation and isolation ward type 1 - Provision of indian and western WC - Provision of Laundry Collection - Provision of BMW and SW
Patient movement corridors	-All wards	Minimum 1.8-2.0m width for double loaded, 1.5m for single loaded	Mechanical	- Corridors for internal movement within wards -180 degree double swing doors with air curtain
Discharge	-All wards -Service corridor	6 sqm	Hybrid	- Discharge clerk desk
Common Room	-Medical corridor	2 sqm/patient	Hybrid	- 180 degree double swing door with air curtain

Annex 2

Schedule of Rooms (4/6)

HEALTH CARE WORKER (HCW) AREAS				
ROOM/ FUNCTION	ACCESS FROM	AREA REQUIRED	VENTILATION	NOTES
HCW Entry/ Exit	-Outside	6-10 sqm	Hybrid	- Direct vehicular access - Security personnel desk
Control Room	-Near HCW entry area	9-12 sqm	Hybrid	- Administrative office
Incharge Room	-Internal corridor	9-12 sqm	Hybrid	
Pharmacy	-Internal corridor	9-12 sqm	Hybrid	
Store	-Internal corridor	9-12 sqm	Hybrid	- Store for PPE and other medical equip.
Retiring Rooms	-Internal corridor	9 sqm/HCW	Hybrid	- M&F Resting Rooms with attached toilets
Staff Dining	-Near entry area	1.5 sqm/person	Hybrid	
PPE Don	-HCW common area	3-6 sqm	Mechanical/ Hybrid	- Near medical corridor accessing wards - Doors with vision panel and air curtain
Dousing Tunnel	-Medical corridor	3 sqm	Mechanical	- Near medical corridor accessing wards - Doors with vision panel
PPE Doff	-Dousing tunnel	3-6 sqm	Mechanical	- Doors with vision panel - Separate collection point for discarded PPE
Toilet	-HCW common area	3-6 sqm	Hybrid	- Located near PPE doffing area.

Annex 2

Schedule of Rooms (5/6)

SERVICES & CORRIDORS				
ROOM/ FUNCTION	ACCESS FROM	AREA REQUIRED	VENTILATION	NOTES
Service Staff Entry/ Exit	-Outside	6-10 sqm	Hybrid	- Direct vehicular access - Security - Air curtain
Pantry	-Service Staff Area	6 sqm	Hybrid	- Direct vehicular access - 180 degree double Swing Door - Direct access to HCW dining area - Off-site cooking is recommended - Disposable crockery and cutlery to be used to avoid associated risks
Store	- Service Staff Area - Pantry	6 sqm	Hybrid	- Convertible into washing area for utensils if required.
PPE Don	-Service Staff Area	3-6 sqm	Mechanical	- PPE Donning Area with storage for PPE - Access to Service Corridor for circulation of meals in wards
Dousing Tunnel	-Service Corridor	3 sqm	Mechanical	- Connected from Service Corridor to PPE Doffing Area.
PPE Doff	-Dousing Tunnel	3-6 sqm	Mechanical	- Separate collection point for discarded PPE
Toilet Block	-Outside	10-15 sqm/ Toilet block	Hybrid	- Separate toilet block for service staff

Annex 2

Schedule of Rooms (6/6)

SERVICES & CORRIDORS				
ROOM/ FUNCTION	ACCESS FROM	AREA REQUIRED	VENTILATION	NOTES
Laundry Collection	-Service Corridor	2 sqm/collection point	Natural	- Off-site or proximate laundry service may be considered
BMW Collection	-Service corridor	2 sqm/collection point	Natural	- Direct vehicular access with separate exit for cleaning - Trained staff for collection and segregation as per BMW rules - Tie up with local PHC/DH for disposal
SW Collection	-Service corridor	2 sqm/collection point	Natural	- Direct vehicular access with separate exit for cleaning - Tie up with local PHC/DH for disposal
Medical Corridor	-HCW Area -Screening Area -Wards	Minimum 1.8-2.0m for double loaded, 1.5m for single loaded	Natural	- Provision of emergency exits - 180 degree double swing door with air curtain
Service corridors	-Wards -Service staff area	Minimum 1.8-2.0m for double loaded, 1.5m for single loaded	Natural	- Access for service staff - Provision of emergency exists - 180 degree double swing door with air curtain
All vestibule areas	-All connections between high-risk and other areas	6 sqm	Mechanical	

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About Indian Institute for Human Settlements (IIHS)

IIHS is a national education institution committed to the equitable, sustainable and efficient transformation of Indian settlements. It provides advisory services to national and state governments, public, parastatal and municipal agencies, international development agencies, and non-profits at the interface of human settlements and urbanisation. IIHS works on innovation, and problem solving at scale in sectors like sanitation, disaster risk and resilience, housing, energy, land governance, planning, climate adaptation and mitigation.

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Tamil Nadu Urban Sanitation Support Programme

Assistance to GoTN for a state wide programme with BMGF support

Coalition for Disaster Resilience Infrastructure

Design of CDRI for UNDRR and NDMA, Gol, with RNI

ASSAR

Climate Adaptation at scale in India and Africa with IDRC support

Recovery with Dignity

Post-emergency recovery in four States with University of East Anglia & GCRF support

Disaster Resilience Leadership

Training DRR leaders in partnership with TISS & GWU

Multi-Hazard Urban Risk Transition Hub

Support to four global cities on urban risk with University of Edinburgh & RNI

CWIS

Assistance to GoTN & Trichy MC for city-wide inclusive sanitation with BMGF support

Design Lab at IIHS: Previous experience in healthcare projects

The Uttar Pradesh Health Systems Strengthening Project (UPHSSP), Government of Uttar Pradesh

- Redesigned Outpatient and Emergency Departments (OPD & ED) in 10 District Hospitals across Uttar Pradesh to improve clinical flow and patient diagnostic experience, and to reduce crowding.
- Proposed a 'Filter Clinic Model' to effectively streamline patient caseloads, and improve patient experience.

Karnataka Health System Development & Reform Project (KHSDRP), Government of Karnataka

- Developed the 'Guidelines for Health Infrastructure (Sites & Buildings) & Procurement toolkit'.
- Conducted a study of 38 healthcare facilities for this purpose; study sites included Auxiliary Nurse and Midwife (ANM) Sub-centres, Primary Health Centres (PHC), and Community Health Centres (CHC).