Report of Site Assessment

for suitability with site action plan

of work to be carried out before installation

SSA/INDQ/2007/00001015-0

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UNICEF

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1. BACKGROUND

UNICEF has designated IT Power India (ITPI) to inspect and install walk-in cold rooms, which includes 4 Walk-in Freezers (WIF), 8 Walk-in-Coolers (WIC) and the replacement of four cooling units of 2 WIFs, at 11 locations in India. As per the Special Service Agreement with UNICEF (no. SSA/INDQ/2007/00001015-0), ITPI is to undertake the following:

1) Assist in identification and need assessment of a suitable location at the site proposed by the state government authorities/UNICEF;
2) Install WIC/WIF at the site as per the guidelines provided in the contract subject to the following: the state government
3) Completing all civil and electrical work at the site;
4) Ensuring that all the required material, including WIC WIF crates, is available at the site.

This report comprises the executive summary and documentation of the detailed site assessments carried out at 11 locations by ITPI between 15 and 12 June 2007.

The evaluation parameters were evolved from The Guideline for Establishing or Improving Primary and Intermediate Vaccine Stores [(WHO/V&B 02.34) Version December 2002] and Equipment Performance Specifications and Test Procedures: Cold Rooms and Freezer Rooms (WHO V&B 02.33).

Mr Ranjit Dhiman, Cold Chain Consultant, ITPI inspected the proposed sites.

2. EXECUTIVE SUMMARY

2.1. MEERUT, UTTAR PRADESH

The proposed site is in the campus of the Lala Lajpat Rai Medical College, office of the Additional Director, Meerut. Installation of a 30 m^3 WIC and a 20 m^3 WIF is due at the site. It already hosts the Meerut District Vaccine Store, where the vaccine is stored in Ice-lined Refrigerators (ILRs) and Deep Freezers (DFs). The site has received a 30 M^3 WIC and additional panels to install a second cold room (without a cooling unit).

The site was earlier assessed in May 2006, and installation has been due since then. The authorities have implemented some of the suggestions recommended earlier. One room has already been prepared for the installation of the WIF. However, since the District Store (which is in building office of AD) has already received the WIC and the readied room is better suited to accommodate the WIC, which is bigger in size, it is recommended that the WIC be installed here. Additionally, minor improvements have been suggested with regard to the furbished room. Another room should be prepared as per the recommendation in Section 4.1.3 for the WIF.

Additional Director, Dr. M.K. Gupta, states that he is not in position to approve installation of the WIC in the room prepared for the WIF, since the administrative procedures required to install a WIF have already been

initiated. The authorities will have to initiate separate communications with the Ministry of Health (MoH) regarding the WIC installation.

It is recommended that the Additional Director of the site issue a memorandum to MoH, UNICEF and ITPI indicating the preferences before the installation team begin work.

Refer to Section 5.1 for the layouts and suggested locations for both WIC and WIF.

Refer to Section 6.1 for images of the site.

2.2. MUMBAI, MAHARSHTRA

The proposed site is located in the premises of the Medical Store Depot, Mumbai Central, Mumbai. The store is one of the main medical depots of the country. The Depot already has 1 WIC and 2 WIFs. Installation of one 30 m^3 WIC and a 20 m^3 WIF is due at the location.

The site has adequate space to host both the WIC and the WIF. Electrical supply is reliable[1] and there is a provision to supply the required power for both the units. At present, the units are not attached to an operational generator; however the store has received a new generator and a suitable location for installation has been identified.

The store is packed with medical supplies and these goods will have to be shifted to another suitable location to make space for the cold rooms.

Refer to Section 4.2.3 for requirements to be fulfilled prior to installation of cold rooms at this site.

Refer to Section 6.2 for images of the store.

The site is ready for installation, except for the power supply connection (a separate three-phase line should be drawn from the central power supply to the building) and basic civil work in the form of raised platform.

2.3. PUNE, MAHARASHTRA

The proposed site is located in the premises of Kutumb Kalyan Bhawan, Pune. A 20 m^3 WIF is to be installed at the site. The proposed location already hosts a 30 m^3 WIC and offices of the store in-charge and the Cold Chain Officer (CCO). The existing layout does not permit installation of the WIF at the proposed location, as the room's size is smaller than the external dimensions of the cold room. However, the site authorities are willing to demolish two of the inner walls to enlarge the room. See Figure 16, Section 5.3 for the existing layout of the facility. The recommended layout with the changes is included as Figure 17 in Section 5.3.

[1] Source: Based on interviews with the staff

The site has reliable power supply. The premise has a transformer installed by the electricity department. A separate three-phase power connection from the transformer to the proposed location has already been approved.

Even though it is possible to install the WIF at the proposed location, some of the recommended standards as per the guidelines cannot be met given the size of the facility. Please refer to Table 1 for a comprehensive picture as to how the site fares against the recommended standards.

2.4. BELGAUM, KARNATAKA

The proposed site is located at the old Vaccine Institute, Tilakwadi, Belgaum. A WIC 30 m^3 is to be installed at the site. It hosts the Regional Vaccine Store and already has a WIC and a WIF installed and functioning. The proposed location is in a large hall, which has direct access to the road. Its size is adequate for installation of the cold room. There is ample space for storing consumables and undertaking ice pack conditioning. The site has reliable power supply, and can be linked to a three-phase dedicated power connection.

The proposed location has two specific problems though, which should be addressed prior to the installation of the cold room. They are:

a) The proposed hall has an AC plant and a chiller plant permanently mounted on the floor. These machines belong to the Vaccine Institute and should be removed to make space for the vaccine store.
b) The site is prone to flooding during heavy rainfall as the floor is parallel to the road. A raised platform (in form of water barrier) to prevent water entering the hall should be constructed to prevent flooding.

The site had not received the cold room unit at the time of assessment. However, the 15 KVA generator and the Servo stabilizer had already arrived.

The proposed site is adequate provided the recommendations listed in Section 4.4.3 are met.

2.5. GULBARGA, KARNATAKA

The proposed site for the cold room installation is located in the existing Regional Vaccine Store, Gulbarga, at the District Health and Family Welfare Office. A 20 m^3 WIF is to be installed here. It is an old building, which was a hospital earlier and has now been converted to a cold store and houses the office of Family Welfare. The proposed location has no direct access to the road, and the vaccine has to be carried to the existing store through the office lobby. The proposed room for the WIF is a hall (14 m x 4.5 m), which is currently the drug warehouse. Refer to Figure 20 for suggested placement of cold room in the hall.

The hall is in good condition; has adequate ventilation; and is well secured.

The site enjoys fairly stable power supply and three-phase dedicated power supply can be drawn from the electricity pole installed in the premises.

The generator can be installed adjacent to the proposed site, where the authorities can construct a covered and secured shed for it.

Subject to installation of electrical line along with distribution panels, and other civil work required, (refer to Section 4.5.3 for recommendations), the site is appropriate for installation of cold room.

2.6. CUDDALORE, TAMIL NADU

The proposed site is located in the same premises as the office of the Additional Director, Family Welfare, Beach Road, Cuddalore. A 30 m^3 WIC is to be installed here. The facility already houses the Regional Vaccine Store, with an 18 m^3 operational WIC that is more than 20 years old.

The proposed location is a large hall on the ground floor of a newly constructed building. The hall has direct access to the road. The hall is well ventilated and is adequate to install the cold room as per the WHO guidelines. The hall can house the storekeeper's office and the diluents and consumables can be stored here. There is ample space for ice pack conditioning and packing of vaccine for shipment.

But the proposed hall does not have the mandatory three-phase dedicated power supply. It is feasible for the administrative office to install a three-phase line from the existing power cables in the premises.

The site has tiled flooring, which makes it easier to keep it clean.

It has already received the generator (15 KVA) and the Servo stabilizer. It has yet to receive the cold room unit.

Once the civil and electrical work as mentioned in Section 4.6.3 has been completed, installation can be undertaken.

Refer to Figure 21 for the drawing and proposed layout of the store.

2.7. BOLANGIR, ORISSA

The site has received a 30 m^3 WIC along with the generator and the stabilizer. The site's Chief Medical Officer (CMO) suggested three possible installation locations; but only two of them were suitable. Of the two, the one that the CMO preferred was further assessed.

The proposed location is in the premises of the Leprosy Building. The site has a large hall and one additional room for the installation of the cold room and the generator respectively. The site has not been in use for a long time and requires thorough cleaning and repainting. The CMO has already applied for a three-phase electrical connection.

The size of the hall (11.1 m X 5.3 m) is adequate for installation of the cold room. The ILRs and DFs can also be shifted from present vaccine store in general hospital premises to this hall, and there is ample space for the

storekeeper's office, storage of diluents and vaccine packing for shipment. The site has direct access to the road, and is well protected from the rain. It is also well ventilated.

The site is appropriate for installation of cold room subject to completion of electrical and civil work as listed in Section 4.7.3.

See Figure 22, Section 5.7 for the suggested location and the site drawing.

2.8. JABALPUR, MADHYA PRADESH

Jabalpur is due to receive a 30 m^3 WIC. The proposed location is in the same premises as that of the office of the Additional Director, Family Welfare and Health Services, Indira Market, Jabalpur.

The Additional director is in the process of identifying a suitable location for installation of WIC. The CMO has proposed that a new hall be constructed adjacent to the refrigeration workshop, on an empty plot located in the same premises. The CMO is willing to initiate construction as per the recommendations in this report, subject to the availability of resources. See Figure 23 in Section 5.8 for the layout and drawing of the proposed construction.

The site has a stable power supply and the CMO can obtain a dedicated three-phase line for the cold room.

But, in its present condition, the site is not ready for installation. It will have to be re-assessed once the proposed construction is completed.

2.9. ALLAHABAD, UTTAR PRADESH

A 30 m^3 WIC has been sanctioned for the vaccine store at Motilal Nehru Hospital, Allahabad. The site has already received the generator and the stabilizer. The proposed location for installation is in a room in the Out Patient Department (OPD) of the Motilal Nehru Hospital. This proposed room faces the present vaccine store, where the old WIC is operational.

The size of the proposed room (6.6 m X 5.25 m) is adequate to accommodate the cold room. There is no room for the storekeeper's office, the storage of consumables, nor the ice-pack conditioning. Refer to Table 1: Summary of site status .

Apart from these limitations, the site has reliable 24 hours dedicated power supply and there is no likelihood of flooding at the site; further, it is also well secured.

It is not possible to implement the recommended standards at the proposed location; however, all in all, it is just adequate to install the cold room.

Refer to Figure 24 in Section 5.9 for a drawing of the site and the suggested layout for the WIC.

2.10. BIKANER, RAJASTHAN

The proposed location is in the campus of Swasthya Bhawan, where the installation of a 30 m^3 WIC is due. The site has not yet received the cold room unit, however it has received the generator and the stabilizer.

The present vaccine store is in the Reproductive and Child Health (RCH) office opposite the General Hospital. It is approximately 4 km away from the proposed location of the WIC. The vaccine store will be moved to the proposed location once the new WIC becomes operational.

A dedicated room has recently been constructed to house the cold room equipment. Guidelines have been closely followed while constructing the room. It has been constructed one meter above the ground level, with a raised loading dock, facilitating the vaccine van to dock to the loading bay. An electrical distribution panel has been installed in a separate room adjacent to the hall prepared for the cold room installation. The room with the electrical panels and distribution box will also house the generator. Space has also been allotted for storage of consumables. An additional room has been constructed to house the cold chain equipment workshop.

The site is directly accessible by road. A major limitation is that it does not have a dedicated three-phase power supply connection; but it is possible to get one line within a week.[2]

The room constructed for the WIC cannot accommodate the storekeeper's office. It is recommended that the storekeeper's office be located within reasonable distance from the cold room.

The site will be ready for the cold room installation upon completion of the minor civil and electrical work recommended in Section 4.10.3.

Refer to Figure 25 for drawings of proposed site and a suggested layout of vaccine store.

2.11. KOLKATTA, WEST BENGAL

The Medical Store Depot of Kolkatta is due for installation of 4 cooling units (2 units each for 2 WIFs). The two freezer rooms were installed at the depot, but the cooling units were reported non-functional. One of the freezer rooms is in good condition and the cooling unit can be installed immediately. The other freezer room is very old, and the walls have been developing cracks and the roof is leaking. It is recommended that an engineer review the physical conditions of the room and, if possible, repair the walls prior to replacement of the cooling units. The store has already received the cooling units and they have been stocked at the depot.

The cooling units can be commissioned immediately.

[2] As suggested by the refrigeration mechanic, Mr. N K Vyas.

3. CONCLUSION

Following the assessment of all the eleven sites, including Kolkatta, the key conclusions are as follows:

1) Vaccine store standards as per WHO guidelines cannot be implemented because the proposed locations cannot accommodate the requirements.
2) The cold and freezer rooms can be installed and commissioned at all the locations provided the electrical and civil work is completed. Major construction work has to be carried out at the Pune and Jabalpur sites for the cold rooms to be housed there.
3) It is not possible to complete installation at the Pune, Jabalpur, Belgaum and Meerut sites (WIF) within the allotted contractual time (i.e. the timeframe of the contract awarded to ITPI) since considerable alterations have to be carried out prior to installation.
4) At all the sites, the officials responsible for managing the vaccine store demonstrated high levels of commitment and extended full cooperation. The installation of the cold rooms will be well supported by these officers and it is expected that they will carry out the required alterations within the allotted time; however the progress of work will depend on the availability of funds and resources at each site.

Refer to Table 1 for summary of site status on the day the assessment was carried out.

Table 1: Summary of site status

Standards required as per the guidelines / status of delivery of equipment	Meerut	Mumbai	Pune	Belgaum	Gulbarga	Cuddalore	Bolangir	Jabalpur	Allahabad	Bikaner
Received WIC at site	✓	×	NA	×	NA	×	✓	×	×	×
Received WIF at site	×	×	×	NA	×	NA	NA	NA	NA	NA
Received Generator at site	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Received Servo Stabiliser at site	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Store Building										

Standards required as per the guidelines / status of delivery of equipment	Meerut	Mumbai	Pune	Belgaum	Gulbarga	Cuddalore	Bolangir	Jabalpur	Allahabad	Bikaner
Water Supply and sanitary facilities	✓	✓	✓	✓	×	✓	✓	NA		✓
Drainage facility	✓	×	✓	×	✓	✓	✓	NA	✓	✓
Adequate lighting	✓	✓	✓	✓	✓	✓	✓	NA	✓	✓
Ventilation of the site	✓	✓	✓	✓	✓	✓	✓	NA	✓	✓
Adequacy of heating and cooling facilities	×	×	×	×	×	×	×	NA	×	×
Communication (phone line)	×	✓	✓	×	×	×	×	NA	×	×
Communication (Data line)	×	×	×	×	×	×	×	×	×	×
Security of site	✓	✓	✓	×	✓	✓	✓	✓	×	✓
Space and Convenience of use										
Adequacy of allotted space for cold room	×	✓	×	✓	×	✓	✓	×	×	✓
Vehicle access	✓	✓	✓	✓	×	✓	✓	✓	×	✓
Loading convenience	×	×	✓	✓	×	✓	✓	NA	×	✓
Security during loading	✓	×	×	×	×	×	×	NA	×	✓
Weather protection during loading	×	×	×	×	×	×	×	NA	×	×
Loading dock	×	×	×	×	×	×	×	NA	×	✓

Standards required as per the guidelines / status of delivery of equipment	Meerut	Mumbai	Pune	Belgaum	Gulbarga	Cuddalore	Bolangir	Jabalpur	Allahabad	Bikaner
Electrical outlet to couple refrigerated trucks	×	×	×	×	×	×	×	×	×	×
Space of /for store keepers office	✓	✓	✓	✓	×	✓	✓	NA	×	✓
Packing area	✓	✓	✓	✓	×	✓	✓	NA	×	✓
Space for storage of consumables	×	✓	×	✓	×	✓	×	NA	×	×
Space for Backup generator	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Availability and quality of power supply										
Reliable power supply	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Electrical safety (standards of electrical work)	×	×	×	✓	✓	✓	×	NA	×	✓

4. DETAILED SITE ASSESSMENT

4.1. MEERUT, UTTAR PRADESH

4.1.1. Observations

The office of the Additional Director, LLR College, Meerut, was to receive a new WIF from UNICEF in the year 2006. Due to a shipment error, the WIC was sent to the store during first quarter of 2006. The Ministry of Health, New Delhi has acknowledged the error, and it was suggested that both the WIC and WIF should be installed at the proposed location.

The present status is as follows:

1) One unpacked new WIC has been stored in the office since 2006.
2) One new WIF is expected but has not yet been received by the store. However, the site has received the crates containing the cold room panels. The cooling units are yet to arrive.
3) The Additional Director has suggested that the civil work undertaken thus far was towards installation of WIF. For installation of WIC, more funds are required.
4) During the assessment in May 2006, two sites were proposed, location “A” and location “B”. (Refer to the assessment report attached as Annexure 8.) The Additional Director now suggests that location “B” is unsuitable. Instead he proposes that another room opposite location “A” be considered. (Refer to Figure 12 for a drawing of location “A” and the newly proposed location “C”.) Location “C” is smaller in size and there is no room for packing of vaccine.

Based on ITPI’s site assessment in May 2006, the Additional Director has carried out civil work at the earlier proposed location for the WIF. However, the recommendations have not been fully addressed. The civil work carried out so far include the following:

1) The platform (plinth) has been raised four inches from the ground at the recommended location.
2) Power distribution box has been installed in the room. (Refer to the images in Section 6.1.
3) A manual changeover switch, between grid power and the genset has been installed.
4) Two air extractor fans have been installed. (Refer to images in Section 6.1.)
5) A new 40 KVA generator has been installed, but is currently nonfunctional as there is no fuel. The earlier report had recommended a 50 KVA generator.
6) A sink has been installed in the room.

However, the above civil and electrical work has not been undertaken according to the standard guidelines. The following need improvement:

1) The electric connection from the central power hub to the manual changeover switch is poorly done.
2) There is no protection provided for the generator and it is exposed to the elements.

The following earlier recommendations need to be carried out:

1) Installation of benches for icepack conditioning and packaging.
2) Mounting of two 1.5-ton air conditioners in the WIF, ice conditioning and packing zones.
3) Installation of two telecommunication lines and telephone sets.
4) Providing shelves in the storage room adjacent to the WIF.
5) Furnishing of the storekeeper's office and inclusion of a secure location to keep records and an air conditioning unit.
6) Minimizing of incendiary risks by:
   - Improving electrical cabling and fault-detection devices (contact breakers).
   - Providing appropriate fire extinguishers at locations adjacent to the generators and cold rooms (CO_2 or powder extinguishers).
7) Installation of smoke detectors and sprinklers in the vaccine storage areas.
8) Building of a hanger along the front of the building housing the WIF. The hanger should not impair the passage of hot air from the ventilation apertures.
9) Installation of two water-resistant electrical sockets on the wall under the hanger.
10) Repainting and tiling of the walls of location "A" and location "C" where the WIF and the proposed WIC are to be installed.

A two-storey building has been newly constructed. Dr. S K Jain, Assistant Additional Director, proposed that two rooms in the building be used to host the WIC and the WIF. The WIC has been delivered to the site and is awaiting installation. The WIF has not yet been delivered. One room is located on the ground floor (location "A") and the other room (location "C") is on same floor opposite to location "A". Location "A" is available to install the new WIC.

A general layout of the Meerut cold store facility is provided in Figure 12.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The dimensions of the room at location “A” are: 9 m by 7.8 m with a height of 3.56 m. The size of the cold room to be installed is 30 m^3 (4.5 m x 3 m x 2.1 m).
2) The dimensions of the room at location “C” are: 6.25 m by 5.5 m with a height of 3.56 m. The size of the freezer room to be installed is 20 M3 (3.75 m x 3 m x 2.1 m).
3) The rooms (at both locations “A” and “C”) are well ventilated. Location “A” has 14 windows; each 1.69 m by 1.3 m in size, and location “C” has 6 windows, each 1.69 m by 1.3 m in size. There are two entry doors at both locations, wide enough for the cold boxes to be carried in and out easily.
4) Both the rooms have shelves and also two cabinets with wooden doors that can be locked.
5) There is sufficient room at location “A” (as per WHO norms and EVSM criteria) for vaccine packaging, a desk and chair for the storekeeper, and sufficient space to store cold boxes, diluents, syringes and droppers.
6) There is a provision for three-phase power supply to both the rooms.

4.1.2. Site status

- ❑ Water supply and sanitary facilities

There is water supply at the proposed location. A sink is available for washing/cleaning, with a provision to evacuate water into an underground drain. However, there is no provision to drain water from the floor in the hall.

- ❑ Drainage

The building is poorly drained, although of modern construction. It has an underground drainage facility outside the proposed location, which is not connected; however, the proposed rooms have no drainage system.

If a raised plinth can be constructed on which the WIF (location “C”) can be mounted, it will prevent eventual corrosion and safeguard against possible flooding. To raise the plinth, the floor loading capacity should be assessed.

- ❑ Lighting

The proposed location has adequate lighting and the room has large windows. The packing area is not exposed to direct sunlight.

- ❑ Ventilation, heating and cooling

The locations proposed for the WIF and WIC have a ceiling height of 3.56 m. Both the rooms are well ventilated, with several windows in each room. Two extractor fans have been installed at location “A”.

Extractor fans are required on the side of the building at location “C”, from where the cold room chiller air is evacuated.

The location does not require any heating.

- Communications

The storekeeper's office, at proposed location "A", does not have a telephone and data telecommunications line (internet). A dedicated line should be established so that it can eventually handle data transfer, while the cold room lines can be linked to the temperature alarms and used for computerized monitoring.

- Security

The cold store facility is housed in a secured compound and provided with guard services. The space allocated is lockable. The likelihood of security threats related to theft or vandalism is low; though security risks with respect to fire are high as no fire extinguishers have been installed in the hall.

- Vehicle access and loading convenience

Vehicles cannot directly access the proposed location. Currently, for the already operating store, packed vaccines are manually transported to the road adjacent to the store, from where they are loaded onto the vehicles. The passageway where vehicle can reach and vaccine is loaded is broad and adequate for vaccine loading.

- Security during loading

The site is adequately secured for loading and unloading of vaccine from the vaccine van. The building is secured with a concrete fence.

- Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of the building or loading point.

- Loading dock

There is no loading dock, and there is no scope to build one.

- Electrical outlet to couple refrigerated trucks

There are no electrical outlets in either the loading area or the passageway. Two outlets using water-resistant sockets should be mounted under the hanger on the wall adjacent to the entrance gate.

- Storekeeper's office

The proposed size of the storekeeper's office is 3 m X 2.5 m, and it has access to the proposed WIC/WIF locations (Locations "A" and "C"). Sufficient natural light enters the room. The furniture in the office should be arranged as indicated in Figure 1, which requires a minimum area of 7.5 m^2. Records can be maintained and kept in this office.

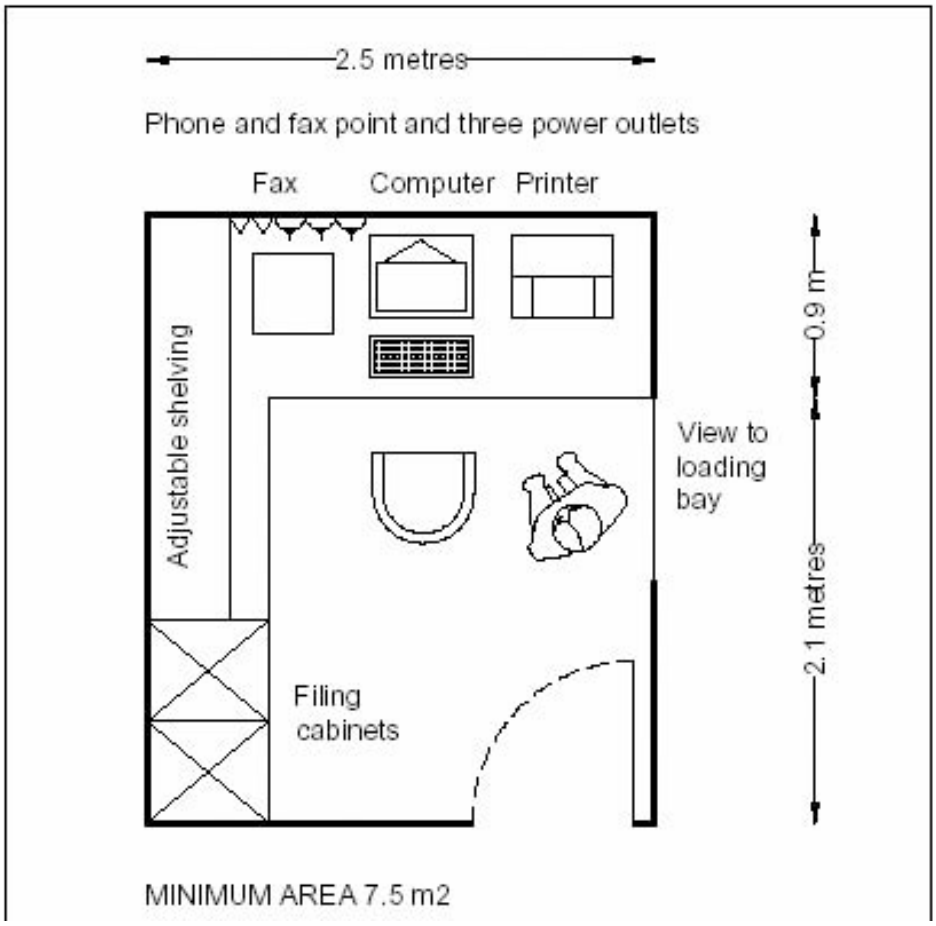


Figure 1: Proposed layout for storekeeper's office

- Packing area

With reference to Figure 2 an “L” shaped zone is available to front and side of the WIC (Location “A”). This area is adequate for icepack conditioning and packing as per WHO-recommended norms. Utilization of this space will approximate that recommended in the WHO layout.

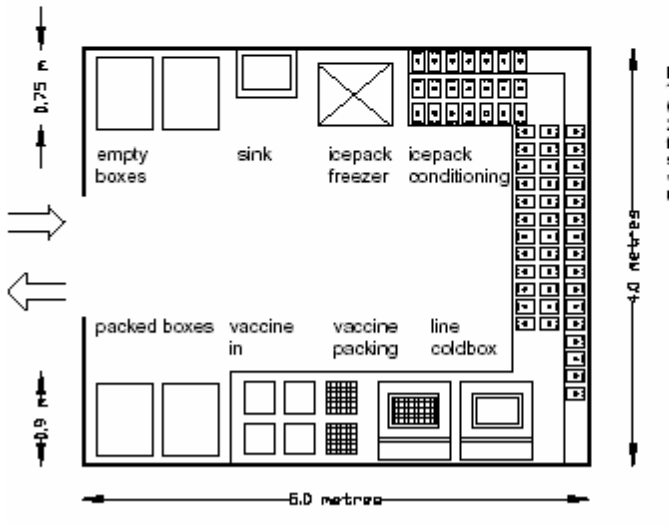


Figure 2: WHO recommended norms for icepack conditioning and packing of vaccine

- Proposed WIF

A 3.75 m x 3 m space has been assigned at proposed location “C” for assembling the 20 m^3 WIF. It should be assembled 0.6 m away from the rear and side walls to permit access for cleaning and assembly purposes. A reinforced-concrete plinth, of 6 to 10 cm thickness is to be poured to provide a base for the WIF. Positioning of the WIF is indicated in Figure 14.

- Storage of consumables

An area of 3.3 m x 3 m is available immediately adjacent to the WIC (Location “A”) for packing of vaccine. This requires storage shelving and is adequate for storage of diluents and immunization-related consumables. No other location or facility is available for the storage of supplies, except for the large lobby in the room.

- Backup generator

A backup generator of 40 KVA has been mounted at the open space adjacent to location “A”. However the generator needs to be housed in a shed.

- Flow of personnel

The flow of movement of personnel associated with the management, reception and distribution and storage of vaccines at this store is shown in Figure 3. The layout is comparable to the model proposed in the WHO reference diagram.

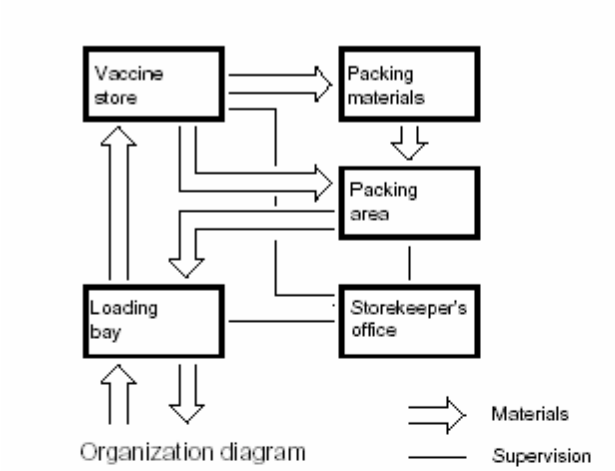


Figure 3: Recommended organisational structure of cold store

- Power situation and stability

The quality of the three-phase power supply from the national grid is reported to be adequate by the electrician (Mr Ambawali).

The new generator (40 KVA) has been installed for the WIC and the WIF.

- Electrical safety

Though every care has been taken to provide safe electrical fittings since the construction is new, open wiring at the distribution panel and fuse bypassing at a few ends pose a security hazard. Electricity supply to the proposed cold rooms is sourced from the central power supply board of the building.

- Circuits with correct rating

Electrical circuits for the proposed cold rooms are fitted with isolators through switchover devices. Each WIF and WIC is wired internally to the central board of the building.

4.1.3. Recommendations linked to installation of cold room

1) Install WIC at location “A” as the space available is adequate as per WHO guidelines.
2) Install WIF at location “C”. The space available is inadequate, but considering that location “A” will be furbished as per recommendations, vaccine packing and ice-pack conditioning need not be undertaken here; therefore the WIF can be installed here.

3) A new three-phase 50 amp electrical line should be drawn from the LT transformer adjacent to the Meerut store. This transformer provides power to the building. The line should be drawn directly to a metering and distribution panel mounted near the generator set.
4) New three-phase distribution lines should be drawn from this distribution panel to each WIF and WIC. The panel should also be connected through an auto-start to the generator.
5) Rewire electrical supply, distribution panels and provide circuit protection for the entire cold room installations, with appropriate connection to the auto-start generator set.
6) Pour a reinforced-concrete slab in the form of a raised plinth of 6 to 10 cm thickness at the location "C" where the new WIF is to be installed. This raised plinth will reduce the risk of inundation from flooding and prevent corrosion during any floor washing. It is to be noted, however, that the floors seem to be washed rarely.
7) Repaint and tile the walls of locations "A" and "C" where the WIF and the WIC are to be installed.
8) Complete the electrical work, including drawing a 3-phase dedicated power supply line with a manual power cut-off switch, for the cold room. (Location "C")
9) Improve the wiring from the central power distribution panel to the manual changeover box at location "A".

4.1.4. Recommendations as per guidelines, not linked to installation of cold room

1) Install two telecommunication lines and telephone sets. (Location "A")
2) Provide shelves in the storage room adjacent to the WIC/WIF. (Locations "A" and "C")
3) Furnish the storekeeper's office and include a secure location to keep records, a heat pump and an air conditioning unit in the office. (Location "A")
4) Minimize risk of fire by:

- Removal of unused inflammable materials from the premises. (Locations "A" and "C")
- Improvement of electrical cabling and fault-detection devices (contact breakers) (Locations "A" and "C")
- Provision of appropriate fire extinguishers at locations adjacent to all generators and cold rooms (CO_2 or powder extinguishers). ("Locations "A" and "C")

5) Install smoke detectors and sprinklers in the vaccine storage areas. ("Locations "A" and "C")

6) Build a hanger along the front of the building housing the WIF. The hanger should not impair the passage of hot air from the ventilation apertures.
7) Install two water-resistant electrical sockets on the wall under the hanger.
8) Install a washing/cleansing bath water supply system and associated drainage points at the location where the new WIF is to be installed. (Location “C”)
9) Install benches for icepack conditioning and packaging. (Location “A”)
10) Mount two 1.5-ton air conditioners in the icepack conditioning and packing zones of Location “A”.
11) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organization, to provide regular preventive maintenance for the WIF and WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

4.1.5. Conclusion

Location “A” is almost ready for installation of WIC, subject to completion of the electrical work. It is best suited for the installation of the WIC; while location “C” is suitable for installation of the WIF. However, officials at the site indicate that provision for WIF has been made at location “A” and they are in the process of initiating official communication for installation of WIC. It is essential that the administrative procedures are complete before proceeding for installation. Location “C” is not ready for installation of WIF and requires substantial civil and electrical work. Additionally, the WIF has not been delivered as yet; therefore the installation of WIF within the contractual timeframe does not appear feasible.

4.2. MUMBAI, MAHARASHTRA

4.2.1. Observations

The proposed site is located in the UNICEF supplies store, at the Medical Store Depot, Mumbai. The location is a 23.8 m x 15.75 m hall. The store presently hosts 2 WICs and 1 WIF, apart from large quantities of empty vaccine packing boxes supplied by vaccine suppliers. The sites were proposed by the DADG. UNICEF will supply a new 20 m^3 WIF, and a 30 m^3 WIC, which will require an area of 4.5 m x 3.6 m and 3.75 m x 3 m respectively.

1) Presently, the proposed location hosts two WICs and one WIF.
2) One WIF has been converted to operate as a WIC.
3) The size of WIF (HUURRE) is 3.6 m x 3.5 m (2 cooling units).

4) The size of the other two WICs are 4.2 m X 4.2 m [converted from WIF (HUURRE)] (2 cooling units) and 9.1 m x 6.1 m (Blue star) (4 cooling units)
5) There are two very old small WICs and WIFs, (metal bodies) refer to images in Section 6.2, lying in the store and not in use. These will be shifted to another location when required.
6) There is a room constructed inside the hall, which hosts the WIF. The size of the room is 5.5 m x 11 m approximately.
7) The store is overlain with empty cold boxes supplied by the vaccine manufacturer, which are used to ship vaccine further to other states.
8) There is only one generator (11 KVA), which is connected to the WIF. The other two WICs are not connected to any generator. However, the power supply is reported to be fairly reliable.
9) The location is well connected to the road. The store is easily accessible for loading and unloading vaccine from the vaccine van.
10) The location is prone to flooding as the level of the floor is raised only 12 inches approximately from the level of road
11) Though the store is not exposed to direct sunlight, there is adequate natural light for packing vaccine.
12) The grid supply to the building is located in the room next to the store, and power to the WICs and WIF is supplied from the junction box, through a 50KVA stabilizer (3-phase, 4-pole).
13) The store in-charge's office is located here. There are no lockable shelves in the office however.
14) The proposed hall has no internal drainage system (water has to be drained manually through the door).
15) There is a water sink installed at the proposed location.
16) There is sufficient room (as per WHO norms and EVSM criteria) for vaccine packaging, to store cold boxes, diluents, syringes and droppers and a desk and a chair for the storekeeper. Refer to room drawing in Annexure 5.2.
17) There is a provision for installation of a three-phase power supply for both the WIC and the WIF.

The general layout of vaccine store and placement of the WIC and the WIF is shown in Figure 15.

4.2.2. Site status

- ❑ Water supply and sanitary facilities

There is water supply at the proposed location. A sink is available for washing/cleaning, with a provision to evacuate water into an underground

drain. However there is no provision for draining water from the floor in the hall.

- ❑ Drainage

Though the construction is fairly new, the drainage facility is poor. The building has an underground drainage facility outside the proposed location, however there is no drainage system inside the proposed rooms.

Constructing a raised plinth on which the WIF and WIC should be mounted will prevent eventual corrosion and safeguard against possible flooding. Before the plinth is laid assessment of the floor-loading capacity would have to be undertaken.

- ❑ Lighting

The proposed location has adequate lighting with large windows. There is no exposure to direct sunlight in the packing area.

- ❑ Ventilation, heating and cooling

The proposed location for the WIF and the WIC has a ceiling height of 3.85 m. It is well ventilated, with 4 large doors (each 2 m wide and 3 m high), and 4 ceiling windows above the door. Two extractor fans have been installed on one of the walls in the hall. However, additional extractor fans are required as it is a large-sized hall and it already hosts three cold rooms.

The location does not require any heating.

- ❑ Communications

The storekeeper's office (the proposed location has a telephone connection connected to the central epabx system, however, store does not have data telecommunication line (internet). The telephone and telecommunications lines should be made available and kept separate so that the storekeeper's office-line can eventually handle data transfer and the cold room lines can be linked to the temperature alarms and used for computerized monitoring.

- ❑ Security

The cold store facility is housed in a secured compound with guard services and the room is lockable. Security threat with respect to theft or vandalism is considered very low. Security risks with respect to fire are also low and there are 4 fire extinguishers installed in the hall.

- ❑ Vehicle access and loading convenience

Vehicles can directly access the proposed location. For the current store, packed vaccines are transported by trolley to the road adjacent to the store from where they are loaded onto the vehicles. The passageway from where vaccine is loaded into the vaccine van is broad and adequate for vaccine loading.

- ❑ Security during loading

The site is inadequately secured for loading and unloading of vaccine from the vaccine van as there is no loading bay or docking station. The vaccine is manually loaded and cold boxes are often subject to damage.

- Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of building or loading point.

- Loading dock

There is no loading dock, and there is no scope to build one.

- Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and at the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

The size of the storekeeper's office is approximately 4 m X 4 m and it has direct access to all the installed WICs, WIF and the proposed WIC/WIF location. Sufficient natural light enters the room. The furniture in the office should be arranged as shown in Figure 1, which requires a minimum area of 7.5 m^2. Records can be maintained and kept in this office.

- Packing area

With reference to Figure 2 an "L" shaped zone is available inside the hall for packing and unpacking of vaccine. This space is adequate for icepack conditioning and packing as per WHO-recommended norms. Utilization of this space will approximate that recommended in the WHO layout.

- Proposed WIF

A space of 3.75 m x 3 m has been assigned at proposed location for assembling the 20 m^3 WIF. It should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness is proposed to provide a base for the WIF. Positioning of the WIF is indicated in Figure 15.

- Proposed WIC

A space of 4.5 m x 3.6 m has been assigned at proposed location for assembling the 30 m^3 WIC. It should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness is proposed to provide a base for the WIF. Positioning of the WIC is indicated in Figure 15.

- Storage of consumables

A space of 4 m x 5.5 m is available immediately adjacent to the WIC (smaller WIC). This requires storage shelving and is adequate for storage of diluents and immunisation-related consumables. No other location or facility is available for the storage of supplies except for the large lobby available in the room.

- Backup generator

An area behind the proposed location (open area) is available to construct a room for a back-up generator. Refer to the images in Section 6.2.

- ❑ Flow of personnel

The flow of movement of personnel associated with the management, reception and distribution and storage of vaccines at this store is shown in the Figure 3. The proposed layout is comparable to the model proposed in the WHO reference diagram.

- ❑ Power situation and stability

The three-phase power supply from the national grid is reported to be adequate by the electrical technician at the site.

There is only one 15 KVA generator at the site, which can provide power backup to only one WIF in the event of longer power cuts.

- ❑ Electrical safety

Though safe electrical fittings have been provided, there is some security hazard in the form of open wiring at the distribution panel and fuse bypassing. Electricity supply to the proposed cold rooms is sourced from the central power supply board of building.

- ❑ Circuits with correct rating

Electrical circuits for the proposed cold rooms are fitted with isolators through switchover devices. Each WIF and WIC is wired internally to the central board of the building.

4.2.3. Recommendations linked to installation of cold rooms

1) A three-phase auto-start generator (supplied by UNICEF) should be installed to ensure backup to the existing WIFs and WICs and the newly supplied WIC and WIF.
2) A new three-phase 50 A electrical line should be drawn from the central power distribution panel of the building. This line should be drawn directly to a metering and distribution panel mounted near the generator set.
3) New three-phase distribution lines should be drawn from this distribution panel to both WIF and WIC. The panel should also be connected through an auto-start to the generator.
4) The electrical supply, distribution panels and circuit protection arrangement for all the cold room installations should be rewired, with appropriate connection to the auto-start generator set.
5) A reinforced concrete slab should be poured in the form of a raised plinth of 6 to 10 cm thickness at the location where the new WIF and WIC is to be located. This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing. It is to be noted, however, that the floors seem to be washed rarely.

6) The required electrical work, including a three-phase dedicated power supply with a manual power cut-off switch for the cold room should be completed.

4.2.4. Recommendations as per guidelines, not linked to installation of cold room

1) Install telecommunication line (data line at the stor keeper's desk).
2) Provide shelves in the storage room adjacent to the old WIC.
3) Furnish the storekeeper's office and include a secure lockable cabinet to keep records.
4) Minimise risk of fire by:

- Removing unused inflammable materials from the premises.
- Improving the electrical cabling for existing installations and fault-detection devices (contact breakers).

5) Install smoke detectors and sprinklers in the vaccine storage areas.
6) Build a hanger along the front of the UNICEF supply building. The hanger should not impair the passage of hot air from the ventilation apertures.
7) Install two water-resistant electrical sockets on the wall under the hanger.
8) Install a washing/cleansing bath water supply system and associated drainage points at the location where the new WIF is to be installed.
9) Install benches for icepack conditioning and packaging.
10) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIF and WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

4.2.5. Conclusion

The Mumbai Medical Store depot has adequate space for installation of both WIC and WIF. Minor improvements are required in terms of protection from water and electrical fittings. The recommended standards as per the WHO guidelines can be implemented at the proposed site except for the installation of air conditioners, as the facility may require a large-scale centralized air conditioning system.

Site is awaiting delivery of the WIC and the WIF. It is feasible to install the cold room subject to the completion of the civil and electrical work outlined in the recommendations linked to installation of WIF/WIC.

4.3. PUNE, MAHARASHTRA

4.3.1. Observations

The proposed site is located in the Leprosy Building on the ground floor, Kutumb Kalyan Bhawan, Pune. It consists of a set of three rooms with a total area of 13.5 m x 5.1 m. The store presently hosts 1 WIC and 1 DF, and the CCO's and the store in-charge's offices.

See Figure 16 for a general layout of the Pune cold store facility.

UNICEF is to supply a new 20 m^3 WIF, which will require an area of 3 m x 3.75 m at the Kutumb Kalyan Bhawan, Pune. This site has been proposed by the CCO, and has been approved by the Additional Director. The size of the proposed location is 13.5 m x 5.1 m.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The new WIF has not yet delivered to the site.
2) Presently, the location already hosts one WIC.
3) The location has 3 rooms. During assessment, it was suggested by CCO that two of the walls be demolished to convert the facility into a big hall in order to host the new WIF (refer to Figure 17).
4) The size of currently installed WIC (HUURRE) is 3.9 m x 3.9 m (2 cooling units).
5) There is one WIF installed in another part of the premises, which has not been operational since last year.
6) There is one auto-start Kirlosker generator (10 KVA) that is connected to WIC.
7) The store has received a Servo Stabiliser and new generator (Kirlosker) (15 KVA capacity), which has not been unpacked.
8) The location is connected to road and is easily accessible for loading and unloading vaccine from vaccine van.
9) The location is safe from exposure to water, since the floor has been raised by 2 feet.
10) Though the store is not exposed to direct sunlight, there is adequate natural light for vaccine packing.
11) The grid supply distribution box of the building is located in the passageway, annex to the CCO's room, the distribution box is connected to the transformer installed in the Kutumb Kalyan Bhawan. Power is supplied to the other changeover switch, which is connected to the auto-start generator and servo voltage stabilizer. Power to the WIC is supplied from this changeover switch through the WIC control panel.
12) The CCO has suggested that a new electric three-phase line be laid from the transformer present to the building for new WIF.

13) The store in-charge's office is located at the proposed location. The office has lockable shelves.

14) The proposed location is well drained, and water cannot enter the building.

15) A sink has been installed at the proposed location.

16) There is in-sufficient space, as per WHO norms and EVSM criteria, for vaccine packaging, the storekeeper's office and for storage of consumables. (Refer to Figure 17).

17) There is a provision of a three-phase power supply for both the existing WIC and the proposed WIF.

4.3.2. Site status

- ❑ Water supply and sanitary facilities

There is water supply at the proposed location. A sink is available for washing/cleaning with a provision to evacuate water into an underground drain.

- ❑ Drainage

The building is well drained, and water cannot enter the building since the flooring has been raised by 2 feet. The building has open drainage facility outside the proposed location.

- ❑ Lighting

The proposed location has adequate lighting since the room has large windows. There is no exposure to direct sunlight at the packing area.

- ❑ Ventilation, heating and cooling

The proposed location is well ventilated, with 1 large door of 1.6 meters wide and 3 meters height, and 4 windows (2 each in present rooms). There is no provision for installation of extractor fans at given location, however 1 extractor fan has been installed already in a room hosting the stabilizer and additional provision can be made at the time reconstruction of building as required to host the WIF.

Extractor fans are required in on one side of the building, from where the cold room chiller air is evacuated.

The location does not require any heating.

- ❑ Communications

The storekeeper's office, at proposed location, has a telephone connection; however, the store does not have a data telecommunication line (internet). The telephone and telecommunications lines should be made available and kept separate so that the office line can eventually handle data transfer, and the cold room lines can be linked to the temperature alarms and used for computerized monitoring.

- Security

The cold store facility is housed in a secured compound with guard services and the space is lockable. Security threats with respect to theft or vandalism are considered very low; but incendiary risks with are high, as no fire extinguishers have been installed in the hall.

- Vehicle access and loading convenience

Vehicles can directly access the proposed location. Currently, for the already operating store, packed vaccines are transported manually to the road adjacent to the store from where they are loaded onto the vehicles. The passageway where the vaccine is loaded into the van is broad and adequate for vaccine loading.

- Security during loading

The site is not adequately secured for loading and unloading of vaccine from vaccine van as there is neither a loading bay nor a docking station. The vaccines are loaded manually and the cold boxes are often subject to damages during this process.

- Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of the building or loading point.

- Loading dock

There is no loading dock, and there is no scope to build one.

- Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and at the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

The proposed size of the storekeeper's office is approximately 2.85 m X 3 m, and it has direct access to the installed WIC and proposed WIF location. Sufficient natural light enters the room. The furniture in the office should be arranged as shown in Figure 1, which requires a minimum area of 7.5 m^2. Records can be maintained and kept in this office.

- Packing area

The proposed location has inadequate space available for packing of vaccine as per the guidelines shown in Figure 2. This space is also inadequate for icepack conditioning and packing as per WHO-recommended norms.

- Proposed WIF

A space of 3.75 m x 3 m is required at proposed location for assembling the 20 m^3 WIF. The WIF can be installed only after demolishing of two interior walls at the location. Refer to Figure 16 for the present layout of the facility and Figure 17 for the placement of WIF after alterations to the building.

The WIF should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness is proposed to provide a base for the WIF.

- ❑ Storage of consumables

The proposed site does not have adequate space to store the consumables in the same premises. At present the consumables are stored in separate building not too far away from cold store.

- ❑ Backup generator

Space is available to install the backup generator. There is an existing backup generator which is operational and connected to the WIC. The space allotted for the generator is in a guarded compound; however a shed needs to be constructed to protect it from the rain.

- ❑ Power situation and stability

The quality of the three-phase power supply from the national grid is reported to be adequate by the electrician at the site.

There is one generator of 15 KVA operational on the site and an additional generator is due for installation for the new WIF. There is adequate power backup in the event of longer power cuts, subject to stock and availability fuel to operate generator.

- ❑ Electrical safety

Since the site needs to be refurbished, the electrical wiring should be done keeping electrical standards in mind. The present electrical installations are good at some places and poor in the common areas (like the lobby, staircase, etc).

- ❑ Circuits with correct rating

Electrical circuits for the proposed cold rooms are fitted with isolators through switchover devices. The WIF should be wired internally to the central board of the building.

4.3.3. Recommendations linked to installation of cold room

1) Carry out the structural changes to the building by demolishing the inner walls as recommended in Figure 17.
2) Install a three-phase auto-start generator (supplied by UNICEF) to ensure backup to the existing WIFs and WICs and to the newly supplied WIC and WIF.

- ❑ Power Distribution

3) A new three-phase 50 A electrical line should be drawn from the transformer installed in the campus of the building. This line should be drawn directly to a metering and distribution panel mounted near the generator set.

4) New three-phase distribution lines should be drawn from this distribution panel to both WIF and WIC. The panel should also be connected through an auto-start to the generator.

5) Pour a reinforced concrete slab in the form of a raised plinth of 6 to 10 cm thickness at the location where the new WIF is to be installed. This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing. It is to be noted, however, that the floors seem to be washed rarely.

6) Complete the required electrical work, including a three-phase dedicated power supply with a manual power cut-off switch for the cold room.

4.3.4. Recommendations as per guidelines, not linked to installation of cold room

1) Install two telecommunication lines (data lines at the storekeeper's desk).

2) Furnish the storekeeper's office and include a secure lockable cabinet to keep records.

3) Minimise risk of fire by:

- Installing fire extinguishers next to WIC and new WIF.
- Improving the electrical cabling for existing installations and fault-detection devices (contact breakers)

4) Install smoke detectors and sprinklers in the vaccine storage areas.

5) Build a hanger along the front of the leprosy building. The hanger should not impair the passage of hot air from the ventilation apertures.

6) Install two water-resistant electrical sockets on the wall under the hanger

7) Install benches for icepack conditioning and packaging.

8) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organization, to provide regular maintenance for the WIF, the WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

4.3.5. Conclusion

The proposed location for installation of WIF is of smaller size then required and it is not possible to setup the store layout as per the guidelines. Also alterations to the building might take much longer time then to cover the installation within the stipulated timeframe in the contract. Site however has reliable power supply and demonstrated good maintenance of electrical standards with existing installed WIC and generator.

4.4. BELGAUM, KARNATAKA

4.4.1. Observations

The proposed site is located in an old vaccine institute building at Tilakwadi, Belgaum. It is situated in a large hall. The site has been proposed by Mr. T. H. Kabade ,Class 1, Mechanical Engineer, on behalf of the Additional Director, who was on tour on the day of the assessment. The proposed location is the only available site for the installation of the WIC.

The office presently hosts 1 WIC and 1 WIF, apart from ILRs and DFs.

A general layout of the site is provided in Figure 18.

UNICEF has supplied new 30 m^3 WIC, which will require an area of 4.5 m x 3.6 m at the old Vaccine Institute. The size of proposed location is 11 m x 7.32 m.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The new WIC has not yet delivered.
2) The site has received a generator (15 KVA) and a Servo stabilizer.
3) The proposed site is directly accessible from the broad road and the vaccine van can load and unload vaccine easily.
4) Presently, the vaccine store hosts one WIC and one WIF, which are installed very close to the proposed location for the WIC.
5) The proposed location has two large-sized machines installed on the ground floor, which belong to the old Vaccine Institute. The machines are not in use any more and can be removed to make space for the WIC.
6) The proposed hall has a large gate, which is lockable. It also has good ventilation and adequate natural light.
7) The site is prone to be flooding as the floor level is the same as that of the road, and there is no protection from water entering the hall.
8) The facility has a centralized power supply system, with a generator providing power backup to the entire office. There is an old generator of 33.5 KVA rating, which provides power backup to the cold rooms.

4.4.2. Site status

- ❑ Water supply and sanitary facilities

There is no water supply or water sink at the proposed location. However, there is a sink close by for washing/cleaning, with a provision to evacuate water into an underground drain. There is no provision for draining water from the floor in the hall.

- ❑ Drainage

The building is well drained considering that this is an old construction. It has an underground drainage system.

Constructing a raised plinth on which the WIF and WIC can be mounted will prevent eventual corrosion and provide a safeguard against possible flooding. Laying of plinth would require assessment of floor loading capacity

- Lighting

The proposed location has large windows, which provide adequate lighting. There is no exposure to direct sunlight in the packing area.

- Ventilation, heating and cooling

The proposed location for the WIC has a ceiling height of more than 4 m. It is well ventilated, with 3 windows, 2 large doors (1.2 m wide and 2.82 m each door), and 10 ceiling windows above the door. However, extractor fans are required as there is no extractor fan in the hall.

Location does not require any heating.

- Communications

The storekeeper's office (at the present location, away from the proposed site) requires a telephone connection. The store does not have a data telecommunication line (internet). The telephone and telecommunications lines (should be made available and) should be kept separate so that the line can eventually handle data transfer and the cold room lines can be linked to the temperature alarms and be used for computerized monitoring.

- Security

The cold store facility is housed in a compound, which is neither guarded, nor is access monitored. However, the space allocated is lockable. Security threats with respect to theft or vandalism are considered high. Security risks with respect to fire are also high as there are no fire extinguishers installed in the hall.

- Vehicle access and loading convenience

Vehicles can directly access the proposed location. Currently, for the already operating store, packed vaccines are transported manually to the road adjacent to the store, from where they are loaded onto the vehicles. The passageway where the vaccine is loaded into the vaccine van is broad and adequate for vaccine loading.

- Security during loading

The site is not adequately secured for loading and unloading of vaccine from vaccine van as there is neither a loading bay nor a docking station. The vaccines are manually loaded and cold boxes are often subject to damages during this process.

- Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of building or loading point.

- Loading dock

There is no loading dock, and there is no scope to build one.

- Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and at the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

The present storekeeper's office is located in a separate room, which is adjacent to the proposed location. The office is in between the existing cold rooms and the proposed location. It is recommended that the office continues to function from the current location considering the easy access to the existing cold room installations.

The storekeeper's office has lockable shelves and records are kept safely.

- Packing area

With reference to Figure 2 an "L" shaped zone is available inside the hall for packing, unpacking of vaccine. This space is adequate for icepack conditioning and packing as per WHO-recommended norms. Utilisation of this space will approximate that recommended in the WHO layout.

- Proposed WIC

A space of 4.5 m x 3.6 m has been assigned at proposed location for assembling the 30 m^3 WIC. It should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness should be poured to provide a base for the WIF. Positioning of the WIC is indicated in Figure 19.

- Storage of consumables

A 4 m x 4m area is available at the proposed location. It is adequate to store diluents and immunization-related consumables but shelves need to be constructed.

- Backup generator

The store has space next to the existing generator to install the new 15 KVA generator. It is adequate as the wiring to the existing cold rooms has already been done from this room and it is easy to manage two generators from the same access point.

- Power situation and stability

The quality of the three-phase power supply from the national grid was reported to be adequate by the mechanical engineer at the site.

There is an operational 33 KVA generator at the site, which is adequate power backup in the event of longer power cuts. Also a new 15 KVA generator for the new WIC is to be installed.

- Electrical safety

The electrical fittings are secure. Electricity supply to the proposed cold rooms is sourced from the central power supply board of the building.

- ❑ Circuits with correct rating

Electrical circuits for existing cold rooms are fitted with isolators through switchover devices. Each WIF and WIC is wired internally to the central board of the building.

4.4.3. Recommendations linked to installation of cold room

1) Install the three-phase auto-start generator (supplied by UNICEF) to ensure backup to the new WIC.
2) Remove the machinery installed in the proposed location, which belongs to old Vaccine Institute.
3) Remove the old furniture and other stationary presently kept at the proposed location.
4) Draw a new three-phase 50 A electrical line from the central power distribution panel of the building.
5) Draw it directly to a metering and distribution panel mounted near the generator set.
6) Draw new three-phase distribution lines from this distribution panel to the WIC. The panel should also be connected through an auto-start to the generator.
7) Pour a reinforced concrete slab in the form of a raised plinth of 6 to 10 cm thickness at the location where the new WIC is to be installed. This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing.
8) Complete the required electrical work, including a three-phase dedicated power supply with a manual power cut-off switch for the cold room.

4.4.4. Recommendations as per guidelines, not linked to installation of cold room

1) Install two telecommunication lines (data lines at the store keeper's desk, in a separate room where storekeeper's office is currently operational).
2) Provide shelves in the storage space adjacent to the new WIC.
3) Minimise risk of fire by:
   - ➢ Removal of unused inflammable materials from the premises.
   - ➢ Improvement of electrical cabling for existing installations and fault-detection devices (contact breakers)

- Installation of fire extinguishers at proposed location and in rooms hosting existing WIC, WIF and storekeeper's office.

4) Install smoke detectors and sprinklers in the vaccine storage areas.
5) Build a hanger along the front of the proposed location. The hanger should not impair the passage of hot air from the ventilation apertures.
6) Install two water-resistant electrical sockets on the wall under the hanger
7) Install a washing/cleansing water supply system and associated drainage points at the location where the new WIC is to be installed.
8) Install benches for icepack conditioning and packaging.
9) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIF and WICs and the generator sets, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

4.4.5. Conclusion

Though the site is located in an old building, it is well maintained. The proposed location is adequate for the installation and commissioning of the WIC. The required standards of the vaccine store as per the guidelines can be implemented at the proposed site. Apart from substantial civil required (of removing the machinery), the site is ready for the installation of the WIC.

4.5. GULBARGA, KARNATAKA

4.5.1. Observations

The proposed site is located in the District Health and Family Welfare office, Gulbarga. The site has been proposed by Dr. Nalini Namoshi (DHO). The location for installation of a 20 m^3 WIF is in a drug warehouse adjacent to District Health Officer's office. The building was a hospital, which has been converted into an office and subsequently into a vaccine store.

See Figure 20 for a general layout along with the proposed location for the installation of WIF.

UNICEF has supplied new 20 m^3 WIF that will require an area of 3.75 m x 3 m. The size of proposed location is 14 m x 4.5m.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) There are 3 rooms available for the installation of the WIF but only one room is suitable for a freezer room.

2) There is an open space available for the installation of a generator opposite to the door.
3) The hall is long, and only a part of it is required for the WIF.
4) The building structure is very old and cannot be altered.
5) The entrance to the facility is only 1 wide. This may pose a problem for loading and unloading vaccine boxes. A suitable large veranda outside the proposed location is in use for packing vaccine.
6) The location does not have direct road access but is only reachable though another room at the entrance of building.
7) The electric supply is fairly stable. There is no dedicated three-phase electricity connection available for the WIF. However a fresh cable can be drawn from an existing three-phase electric pole located next to the facility.
8) The site has not yet received the WIF but the Servo Stabiliser and Kirlosker Genset of 15 KVA size have been received.
9) The site is protected from water due to a 1-foot rise from internal veranda and 4 feet rise from ground level.
10) The room has 9 ventilators, 4 on each long side and 1 on west side. It also has 4 windows on the south side of the wall.

4.5.2. Site status

- Water supply and sanitary facilities

There is no water supply or water sink at the proposed location. However, a sink is available near the proposed location for washing/cleaning with a provision to evacuate water into an underground drain. There is provision of draining water from the floor in the hall.

- Drainage

The building is well drained considering that this is an old construction. It has an underground drainage system.

Constructing a raised plinth on which the WIF and the WIC can be mounted will prevent eventual corrosion and provide a safeguard against possible flooding. Laying of plinth would require assessment of floor loading capacity.

- Lighting

The proposed location has large windows that provide adequate light. There is no exposure to direct sunlight at the packing area.

- Ventilation, heating and cooling

The proposed location for the WIF has a ceiling height of more than 4 meters. It is well ventilated, with 9 ventilators and 4 windows. However, two extractor fans are required.

Location does not require any heating.

- Communications

The storekeeper office is located in a separate room, which has telephone lines. However, the store does not have data telecommunication line (internet). The telephone and telecommunications lines (should be made available and) should be kept separate so that the storekeeper's office line can eventually handle data transfer and the cold room lines can be linked to the temperature alarms and used for computerised monitoring.

- Security

The cold store facility is housed in a secured compound with guard services and the room is lockable. Security threats with respect to theft or vandalism are considered very low; but risks with respect to fire are high as no fire extinguishers have been installed in the hall.

- Vehicle access and loading convenience

Vehicle cannot reach the store directly. The vaccine is carried manually in cold boxes from the road through the administrative office to the store.

- Security during loading

The site is not adequately secured for loading and unloading of vaccine from vaccine van as there is neither a loading bay nor a docking station. The vaccine is loaded manually and the cold boxes are often subject to damage during this process.

- Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of building or loading point.

- Loading dock

There is a no loading dock but there is a scope of building one. The loading dock should be constructed next to the exit gate of the building where vaccine van can dock for easy loading and unloading of vaccine.

- Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and in the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

The present storekeeper's office is located in a separate room, which is adjacent to the proposed location. The office is in the middle of the existing cold rooms and proposed location and has an easy access to the other existing cold room installations. The storekeeper's office has lockable shelves and records are kept safely.

- Packing area

The proposed location does not have any space for packing of vaccine. However, there is ample space available outside the room for proper packing of vaccine and ice pack conditioning.

- ❑ Proposed WIF

A space of 3.75 m x 3 m is required at proposed location for assembling the 20 m^3 WIF. It should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness should be poured to provide a base for the WIF. Positioning of the WIF is indicated in Figure 20.

- ❑ Storage of consumables

There is no separate space available for storage of consumables. At present consumables are stored in drug warehouse and in the available space outside the proposed location.

- ❑ Backup generator

The new 15 KVA generator can be installed in a road accessible space located next to the proposed site. A shed needs to be constructed to protect it from the rain.

- ❑ Power situation and stability

The mechanical engineer at the site confirms that the quality of the three-phase power supply from the national grid is adequate. A backup generator for cold room has been supplied for installation.

- ❑ Electrical safety

A distribution panel and control circuit needs to be installed on the wall next to the proposed WIF location. The building's electrical fittings are safe.

4.5.3. Recommendations linked to installation of cold room

1) A three-phase auto-start generator (supplied by UNICEF) should be installed to ensure sufficient backup to the newly supplied WIF.

- ❑ Power distribution

2) A new three-phase 50 A electrical line should be drawn from the electric pole available near to the proposed site. This line should be drawn directly to a metering and distribution panel mounted near the generator set.
3) New three-phase distribution lines should be drawn from this distribution panel to WIF. The panel should also be connected through an auto-start to the generator.
4) Pour a reinforced concrete slab in the form of a raised plinth of 6 to 10 cm thickness at the location where the new WIF is to be installed. This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing. It is to be noted, however, that the floors seem to be washed rarely.

5) Complete the required electrical work, including a three-phase dedicated power supply with a manual power cut-off switch for the cold room.

4.5.4. Recommendations as per guidelines, not linked to installation of cold room

1) Install two telecommunication lines (data lines at the store keeper's desk).
2) Minimise risk of fire by:
   - Removing unused inflammable materials from the premises.
   - Ensuring safe electrical cabling for existing installations and fault-detection devices (contact breakers).
   - Installing fire extinguishers at the proposed location and existing cold room installations.
3) Install smoke detectors and sprinklers in the vaccine storage areas.
4) Build a hanger along the front of the building at the vaccine loading area.
5) Install two water-resistant electrical sockets on the wall under the hanger
6) Install a washing/cleansing water supply system and associated drainage points at the location where the new WIF is to be installed.
7) Install benches for icepack conditioning and packaging in the veranda outside the proposed location.
8) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIF and WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

4.5.5. Conclusion

Though the proposed site is small, there is no other alternative for the installation of new WIF. There is ample space available in the veranda for packing of vaccine and ice pack conditioning. Once the electricity line is drawn and the power distribution box has been installed, the location is ready for installation.

4.6. CUDDALORE, TAMIL NADU

4.6.1. Observations

The proposed site is located in the premises of Deputy Director-Health Services, Beach road, Cuddalore. It has been proposed by the Administration Officer, Mr. Jothi Ramajayam.

See Figure 21 for a general layout of the Cuddalore proposed site for the WIC.

UNICEF has supplied new 30 m^3 WIC which will require an area of 4.5 m x 3.6 m. The size of the proposed location is 11.7 m x 7.05 m and is located in a newly constructed building.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The site has not received the WIC yet. However, it has received the 15 KVA generator and the Servo stabilizer.
2) Two sites were proposed by the administrative officer, one of which is unsuitable for installing the new WIC due to its small in size, and the need to remove the partition present in the room to accommodate the cold room.
3) The second site is located on the ground floor of the newly constructed building. This construction is on-going but the finishing work is almost complete. This location was further assessed as it was considered more suitable for the cold room installation.
4) This proposed site has a large hall sufficient to host the WIC and move the existing ILRs and DFs to this location.
5) There is no dedicated power supply available at the location for WIC however the officers has suggested that they will extend the existing three-phase power supply from building less than 50 meters away.
6) There is no room for generator but a shed and lockable room can be constructed next to the hall.
7) The facility has an operational WIC (with metal walls), which is more than 25 years old. The WIC will be used as long as it is operational and there is no provision to replace it with a new one.

4.6.2. Site status

- ❑ Water supply and sanitary facilities

The building is of recent construction. There is a sink with a washing area and rest room next to the room.

- ❑ Drainage

The room is well drained with proper drainage system in place. The room has tiled flooring, which facilitates floor washing.

- ❑ Lighting

The hall has 8 windows and 2 doors, which provide adequate natural lighting. The room is also equipped with tube lights at adequate distance from each other.

- ❑ Ventilation, heating and cooling

The room has 8 windows, 1.6 m X 1.25 m each. Air conditioning is required at vaccine packing area.

The location does not require any heating.

- ❑ Communications

The storekeeper's office in the proposed location requires a telephone connection. The store does not have data telecommunication line (internet). The telephone and telecommunications lines (should be made available and) should be kept separate so that the storekeeper's office line can eventually handle data transfer and the cold room lines can be linked to the temperature alarms and used for computerised monitoring.

- ❑ Security

The cold store facility is housed in a secured compound with guard services and the room is lockable. There is very little security threat with respect to theft or vandalism is considered very low; security risks with respect to fire can be reduced by the installation of four fire extinguishers in the hall.

- ❑ Vehicle access and loading convenience

Vehicles can directly access the proposed location. Currently, for the already operating store, packed vaccines are transported manually to the road adjacent to the store, from where they are loaded onto the vehicles. The passageway where the vaccine is loaded into the vaccine van is broad and adequate for vaccine loading.

- ❑ Security during loading

The site is not adequately secured for loading and unloading of vaccine from vaccine van as there is neither a loading bay nor a docking station. Vaccine is manually loaded and, cold boxes are often subject to damage during this process.

- ❑ Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of the building or loading point.

- ❑ Loading dock

There is a no loading dock but there is a scope of building one. A loading dock should be constructed next to the exit gate of the building where vaccine van can dock for easy loading and unloading of vaccine.

- Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and at the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

The size of the proposed storekeeper's office is approximately 3 m X 3 m and it has direct access to the new WIC. The furniture in the office should be arranged as shown in Figure 1, which requires a minimum area of 7.5 m^2. Records can be maintained and kept in this office.

- Packing area

With reference to Figure 2 an "L" shaped zone is available inside the hall for packing and unpacking of vaccine. This space is adequate for icepack conditioning and packing as per WHO-recommended norms. Utilization of this space will approximate that recommended in the WHO layout.

- Proposed WIC

A space of 4.5 m x 3.6 m is required at the proposed location for assembling the 30 m^3 WIC. It should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness should be provided as a base for the WIC. Positioning of the WIC is indicated in Figure 21.

- Storage of consumables

There is no space available for storage of consumables at the proposed location. At this time, the consumables are stacked up in the office lobby, next to present vaccine store.

- Backup generator

There is a space available adjacent to the proposed location (open area) in which a shed can be constructed for the generator. Refer to the images in Section 6.6.

- Power situation and stability

The quality of the three-phase power supply from the national grid is reported to be adequate by administrative officer present on the site.

4.6.3. Recommendations linked to installation of cold room

1) A three-phase auto-start generator (supplied by UNICEF) should be installed to ensure backup power supply to the newly supplied WIC.

- Power distribution

2) A new three-phase 50 A electrical line should be drawn from the central power distribution panel of the building which is 50m away from proposed location. This line should be drawn directly to a metering and distribution panel mounted near the generator set.

3) A new three-phase distribution lines should be drawn from this distribution panel to the WIC. The panel should also be connected through an auto-start to the generator.

4) A reinforced concrete slab in the form of a raised plinth of 6 to 10 cm thickness should be pored at the location where the new WIC is to be installed. This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing. It is to be noted, however, that the floors seem to be washed rarely.

5) Complete the required electrical work, including a 3-phase dedicated power supply with a manual power cut-off switch for the cold room.

4.6.4. Recommendations as per guidelines, not linked to installation of cold room

1) Install two telecommunication lines (data lines at the store keeper's desk).

2) Provide shelves in the storage room adjacent to the old WIC.

3) Furnish the storekeeper's office and include a lockable cabinet for record keeping.

4) Minimise risk of fire by installing fire extinguishers in the proposed room.

5) Install smoke detectors and sprinklers in the vaccine storage areas.

6) Build a hanger along the front of the building. The hanger should not impair the passage of hot air from the ventilation apertures.

7) Install two water-resistant electrical sockets on the wall under the hanger.

8) Install a 10-ton air conditioning system at the proposed location.

9) Install benches for icepack conditioning and vaccine packaging.

10) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

4.6.5. Conclusion

The newly constructed room is ideal for a cold store facility. But there is no space for the storage of consumables. The recommended standards as per the WHO guidelines can be implemented if the entire room is made available to the store. The site will be ready for installation of WIC upon completion of the electrical connections and minor civil work.

4.7. BOLANGIR, ORISSA

4.7.1. Observations

The proposed site is located in the premises of Leprosy building, near warehouse (medical store), Bolangir. The proposed location for the installation of a 30 m^3 WIC is in a old constructed building. The site was proposed by the CMO as the most feasible and immediately available option.

See Figure 22 for a general layout of the Bolangir proposed site.

UNICEF has supplied new 30 m^3 WIC which will require an area of 4.5 m x 3.6 m. The size of proposed location is 11.1m x 5.3 m.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The site has received the WIC. The unpacked unit is stored in a secure place in the general hospital premises.
2) The site has also received the stabilizer and the generator.
3) The authorities have proposed two rooms for the installation of the WIC. The first room is very small and filled with stock. The staff does not see it as an option and suggest installation of the WIC at the second location.
4) The second room is in the Leprosy building. The entire wing of the single-floor building is vacant. There is a large hall in the proposed location which is sufficient to install WIC and host the ILR's and DF's which are currently installed in a damp and old, fragile building. Since this site was found to be more suitable, it was further assessed.
5) The CMO has applied for a new three-phase electrical connection, which can be provided at either of the proposed locations.
6) In terms of civil work, the second site requires minimum work except for the cleaning and repainting of walls and repairing of the main entrance gate. This site also has a room for the generator and for storing spare parts and fuel.
7) Refer to Figure 22 for proposed layout for vaccine store and placement of the WIC.

4.7.2. Site status

- ❑ Water supply and sanitary facilities

There is adequate water supply at the proposed location. A sink is available for washing/cleaning with a provision to evacuate water into an pit-hole drainage system. However there is no provision for draining away water from the floor in the hall of flooding or when the floors are cleaned.

The building is poorly maintained as the facility has been out of use for a long time. The space required to be substantially cleaned up to convert the facility into the vaccine store.

- ❑ Drainage

The building is well drained considering that this is an old construction. The floor is elevated by about 30 cm from ground level.

Constructing a raised plinth on which the WIC can be mounted will prevent eventual corrosion and provide a safeguard against possible flooding. Plinth construction would require the assessment of the floor loading capacity.

- ❑ Lighting

The proposed location has large windows that provide adequate lighting. There is no exposure to direct sunlight at the packing area.

- ❑ Ventilation, heating and cooling

The proposed room has a ceiling height of more than 3 m. It is well ventilated, with 8 large windows of 1.1 m width each. The site requires extractor fans to ventilate the large hall. The vaccine packing area needs to be air-conditioned.

The location does not require any heating.

- ❑ Communications

The storekeeper's office is currently located in the general hospital, about 100m away from the present vaccine store. The office should be relocated to cold-room installation site. Separate telephone and telecommunications lines should be made available so that the storekeeper's office line can eventually handle data transfer, and the cold room lines can be linked to the temperature alarms and used for computerized monitoring.

- ❑ Security

The proposed cold store location is housed in a walled compound with no guard services at present. The room is lockable, though the grilled gate requires repair. There is no great security threat with respect to theft or vandalism; however, security risk with respect to fire is high as there are no fire extinguishers installed in the hall.

The present vaccine store is located in a building with open access. The security threat with respect to theft is considered very high.

- ❑ Vehicle access and loading convenience

Vehicles can directly access proposed Location. The site is connected to a broad road.

- ❑ Security during loading

The site is not adequately secured for loading and unloading of vaccine from vaccine van as there is no loading bay or docking station.

- ❑ Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of building or loading point. .

- Loading dock

There is a no loading dock but there is a scope of building one. The loading dock should be constructed next to the exit gate of the building, where the vaccine van can dock for easy loading and unloading of vaccine.

- Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and at the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

The size of the proposed storekeeper's office is approximately 4 m X 3.5m and it has direct access to the proposed WIC location. The furniture in the office should be arranged as shown in Figure 1, which requires a minimum area of 7.5 m^2. Records can be maintained and kept in this office.

- Packing area

With reference to Figure 2 an "L" shaped zone is available inside the hall for packing and unpacking of vaccine. This space is adequate for icepack conditioning and packing as per WHO-recommended norms. Utilization of this space will approximate the criterion outlined in the WHO layout.

- Proposed WIC

A space of 4.5 m x 3.6 m has been assigned at the proposed location for assembling the 30 m^3 WIC. It should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness has to be poured to provide a base for the WIC. Positioning of the WIC is indicated in Figure 22.

- Storage of consumables

A small space of about 2 m x 2.5 m is available immediately adjacent to the proposed storekeeper's office. This requires storage shelving and is adequate for storage of diluents and immunization-related consumables.

There are two more additional rooms available at the facility, which can be used as a storeroom for consumables.

- Backup generator

A separate room located close to the proposed site of the WIC is available to mount a generator. This requires electrical wiring from the generator room to the proposed location of WIC. Refer to Figure 22 for details.

- Power situation and stability

The cold chain officer at the site has confirmed that the quality of the three-phase power supply from the national grid is adequate.

A new 15 KVA generator has been supplied to the site and is to be installed. This generator will be adequate to power the cold room in the event of power cuts.

4.7.3. Recommendations linked to installation of cold room

1) Install a three-phase auto-start generator (supplied by UNICEF) to ensure backup to existing ILR's and DF's and the newly supplied WIC.
2) A new three-phase 50 A electrical line should be drawn from the electrical transformer 200m away from the proposed site to panel of the building. This line should be drawn directly to a metering and distribution panel mounted near the generator set.
3) New three-phase distribution lines should be drawn from this distribution panel to WIC. The panel should also be connected through an auto-start to the generator.
4) The electrical supply, distribution panels and circuit protection arrangement for all the electrical apertures in the room should be rewired
5) A reinforced concrete slab, in the form of a raised plinth of 6 cm to 10 cm thickness should be poured at the location where the new WIC is to be installed. This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing. It is to be noted, however, that the floors seem to be washed rarely.
6) All the electrical work, including drawing of a three-phase dedicated power supply line with a manual power cut-off switch for the cold room needs to be completed.
7) The proposed premises need to be cleaned and the walls whitewashed. The electrical connections and wiring in the room need improvement.

4.7.4. Recommendations as per guidelines, not linked to installation of cold room

1) Install two telecommunication lines (data lines at the store keeper's desk).
2) Provide shelves in the storage room for consumables.
3) Furnish the storekeeper's office and include a lockable cabinet for record keeping.
4) Minimise risk of fire by:

- Removal of unused inflammable materials from the premises.
- Improvement of electrical cabling for existing installations and fault-detection devices (contact breakers)

- Installation of fire extinguishers at the proposed site

5) Install smoke detectors and sprinklers in the vaccine storage areas.
6) Build a hanger along the front of the building. The hanger should not impair the passage of hot air from the ventilation apertures.
7) Install two water-resistant electrical sockets on the wall under the hanger
8) Install benches for icepack conditioning and packaging.
9) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

4.7.5. Conclusion

The proposed site is of adequate size to host the vaccine store. But it requires substantial cleaning and refurbishment prior to installation. The proposed site is a better option as compared to the existing facility. The site is ready for installation of the cold room subject to completion of the electrical and civil work recommended above.

4.8. JABALPUR, MADHYA PRADESH

4.8.1. Observations

The proposed site is located in the premises as the office of the Deputy Director, State Health and Family Welfare, Near Indira Market, Railway station line, Jabalpur. This location was proposed by the Joint Director as the most feasible and immediate option available.

UNICEF has scheduled to install a 30 m^3, WIC, HUURRE at this site, which will require an area of 4.5 m x 3.6 m. The size of proposed location is 7 m x 5.5 m. It is an open area adjacent to the state cold chain workshop, and a room needs to be constructed to house the WIC.

See Figure 23 for a general layout of the Jabalpur proposed site for WIC.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The site has not received the WIC yet, however it has received the servo stabiliser and 15 KVA generator.
2) A room needs to be constructed at the proposed location, as presently the site is an empty plot located next to the cold chain workshop.

3) Another option suggested was the construction of a multi-storey building at another location. A proposal has been submitted by the Joint Director to the Bhopal Family Welfare Director, which includes the architectural plan of the building. This site is intended to house the WIC, but since the entire process might take almost 2 years for completion, it is not the preferred option.
4) There is an existing WIC installed at St Govind Das District hospital (also knows as Victoria Hospital). This hospital hosts the regional and district stores. The proposed site, which is in the premises of Joint Director, will host the regional vaccine store and the district vaccine store continues to operate from Victoria hospital.
5) According to Dr. Shafadullah, a separate connection from the transformer may not be a feasible option. Since the building already has a three-phase connection, it could be extended to the WIC when the site is ready for installation.
6) There is inadequate space for storage of consumables. A space will also be available in the proposed new two-storey building.

4.8.2. Recommendations linked to installation of cold room

1) A room should be constructed for both the WIC and the generator as per the layout suggested in Figure 23 and as per the recommended electrical and civil work outlined below.
2) A three-phase auto-start generator (supplied by UNICEF) needs to be installed to ensure power backup to the new WIC.
3) A new three-phase 50 A electrical line should be drawn from the central power distribution panel of the building. This line should be drawn directly to a metering and distribution panel mounted near the generator set.
4) A new three-phase distribution lines should be drawn from this distribution panel WIC. The panel should also be connected through an auto-start to the generator.
5) The electrical supply, distribution panels and circuit protection arrangement for all the cold room installations should be rewired, with the appropriate connection to the auto-start generator set.
6) A reinforced concrete slab should be poured in the form of a raised plinth of 6 cm to 10 cm thickness at the location where the new WIC is to be installed. This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing.
7) The electrical work, including drawing of a dedicated 3-phase power supply with a manual power cut-off switch for the cold room needs to be completed.

4.8.3. Recommendations as per guidelines, not linked to installation of cold room

1) Install two telecommunication lines (data lines at the storekeeper's desk).
2) Provide shelves in the allotted storage room.
3) Furnish the storekeeper's office and include a secure lockable cabinet for recordkeeping.
4) Minimise risk of fire by installing fire extinguishers at the proposed location.
5) Install smoke detectors and sprinklers in the vaccine storage areas.
6) Build a hanger that should not impair the passage of hot air from the ventilation apertures.
7) Install two water-resistant electrical sockets on the wall under the hanger.
8) Install a washing/cleansing water supply system linked to a drainage facility.
9) Install benches for icepack conditioning and packaging.
10) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance for the WIC and the generator, and also to ensure prompt response and quality maintenance services for unscheduled equipment failures.

4.8.4. Conclusion

The site is not ready for installation of the WIC as it does not have a room to host the WIC. Construction work needs to be undertaken, which might take anywhere between 3 to 6 months, subject to availability of resources. Since the plan is to construct a new room, it is strongly recommended that it be built to the required standards.

4.9. ALLAHABAD, UTTAR PRADESH

4.9.1. Observations

The proposed site is located in the premises of Motilal Nehru District Hospital, OPD ward, Allahabad, Uttar Pradesh.

UNICEF has scheduled to install a 30 m^3, WIC, HUURRE at this site, which will require an area of 4.5 m x 3.6 m.

The size of proposed location is 6.6 m x 5.25 m. It is located in the Out-Patient Ward (opposite to the cold store room).

Refer to Figure 24 for a general layout of the Allahabad proposed site.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The site has not received the WIC yet; however the generator and stabiliser arrived on the day of assessment. They were stored at the cargo office until the additional director organized proper storage arrangements.
2) The Additional Director also mentioned that they had already contacted Kirloskar Ltd (manufacturer of the generator) for its installation at the proposed site.
3) The proposed site is the only one available as per the additional director.
4) The hospital has uninterrupted power supply which renders this limited space adequate by the authorities for the installation of the cold room.
5) The site already has vaccine store operational at the location, with an old WIC installed at the store. The Additional director has suggested maintaining the vaccine store at the current place. However, there are ILR's and DF's installed at the proposed location for WIC. Relocation of these equipment to alternative place is under discussion
6) There is a government drug warehouse about 15 KM far from the Motilal Nehru Hospital. This warehouse could be a possible alternative for relocating the vaccine store, but as of now the officials are not in agreement on this option.
7) The current store is being operational out of a very small area, with no space for packing of vaccine, ice-pack conditioning nor storage of consumables.
8) The site has a generator but it has not been operational for a very long time. This does not become a critical issue as long as power supply is guaranteed for 24 hours.
9) An open space has been identified for the installation of the generator. A decision on will be taken would be taken shortly in collaboration with Kirloskar Ltd.

4.9.2. Site status

- ❑ Water supply and sanitary facilities

There is no sink with running water at the proposed location. However, such a facility is available close to the proposed location for washing/cleaning, with a provision to evacuate the water into an underground drain. There are also provisions for draining the water from the floor.

- ❑ Drainage

The building is well drained. The building has an underground drainage system.

Constructing a raised plinth on which the WIC can be mounted will prevent eventual corrosion and provide a safeguard against possible flooding. Pouring of plinth would require an assessment of floor loading capacity.

- Lighting

The proposed location has adequate lighting with large windows. There is no exposure to direct sunlight at the packing area.

- Ventilation, heating and cooling

The proposed location has a ceiling height of 2.85 m. The area is well ventilated, with 4 windows of 0.83 m width each. There are no extractor fans, which need to be installed to evacuate the hot air coming from the cooling units.

The location does not require any heating. The room is small in size and a 2-ton air conditioner is sufficient to cool the packing area.

- Communications

The site does not have room for the storekeeper's office. Separate telephone and telecommunications lines should be installed, which can be linked to the temperature alarms in the cold room and be used for computerized monitoring.

- Security

The proposed room is housed in the hospital premises, in the corridor of OPD ward with direct access to the general public. The site only has a lockable door thus at risk for theft. Incendiary risks are also high risk as there are no fire extinguishers installed in the premises.

- Vehicle access and loading convenience

The site does not have direct access to the road preventing vehicles from direct loading and unloading of vaccine. At present, the vaccine is manually transported in cold boxes to the hospital's exit gate, from where it is loaded into the vaccine van. However, the lobby connecting the current vaccine store and the proposed site to the exit gate is broad and adequate to transport cold boxes in and out of store.

- Security during loading

The site is not adequately secured for loading and unloading of vaccine from vaccine van as there is no loading bay or docking station. Vaccine is loaded manually and cold boxes are often subject to damages during this process.

- Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of building or loading point.

- Loading dock

There is a no loading dock but there is a scope of building one. The loading dock should be constructed next to the exit gate of the building where the vaccine van can dock for easy loading and unloading of vaccine.

- ❑ Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and in the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- ❑ Storekeeper's office

There is no room for the storekeeper's office. At present, the storekeeper's office is located in the office of the Additional Director, civil lines, Allahabad which is 5 km away from Motilal Hospital. There is a Multi Purpose Health (MPH) worker who handles emergencies at the store.

- ❑ Packing area

The site does not have adequate space for packing of vaccine and ice-pack conditioning. At present, ice pack conditioning is not practiced at the store. The lobby outside the present store is often used for packing of vaccine.

- ❑ Proposed WIC

The size of the proposed room is inadequate to install the WIC and it cannot be refurbished as per the guidelines. However, a 4.5 m x 3.6 m area has been assigned for assembling the 30 m^3 WIC. It should be assembled 0.6 m away from the rear and sidewalls to allow easy access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 cm to 10 cm thickness needs to be poured to provide a base for the WIC. Figure 24 illustrates where the WIC should be placed.

- ❑ Storage of consumables

There is no room for storage of consumables at the proposed site. At present, the stocks are stored in the drug warehouse, or in the office campus of the Additional Director.

- ❑ Backup generator

The site does not have an operational backup generator but since the power supply is uninterrupted at the hospital, the need for a generator has not been critical thus far. An empty space has been identified adjacent to present non-operational generator shed for the installation of new 15 KVA generator for the new WIC.

- ❑ Power situation and stability

The power supply to the hospital has been stable for the past two years. Reliable power supply has been one of the key factors determining the location for the WIC.

- ❑ Electrical safety

Safe electrical fittings have been provided in the building. Electricity supply to the proposed cold room is expected to originate from the central power supply board of the building.

4.9.3. Recommendations linked to installation of cold room

1) The three-phase auto-start generator supplied by UNICEF should be installed to ensure power backup to the newly supplied WIC.
2) A new three-phase 50 A electrical line should be drawn from the central power distribution panel of the building. This line should be drawn directly to a metering and distribution panel mounted near the generator set.
3) New three-phase distribution lines should be drawn from this distribution panel to the WIC. The panel should also be connected through an auto-start to the generator.
4) The electrical supply, distribution panels and circuit protection arrangement for all the cold room installations should be rewired, with appropriate connections to the auto-start generator set.
5) A reinforced concrete slab in the form of a raised plinth of 6 cm to 10 cm thickness should be poured at the location. This will reduce the risk of inundation due to flooding and the likelihood of corrosion when the floors are washed. However, the floors seem to be washed rarely.
6) The required electrical work, including drawing of a three-phase dedicated power supply with a manual power cut-off switch for the cold room, should be completed.
7) The walls and windows of the room need to be repainted. The walls need to be tiled up to 1.5 m from the ground level for easy cleaning and maintenance.

4.9.4. Recommendations as per guidelines, not linked to installation of cold room

1) Allocate a separate room for the storekeeper's office near the present cold store. It should be furnished and include a secure lockable cabinet for recordkeeping.
2) Allocate a separate room for storage of consumables. Provide shelves in the storage room.
3) Install two telecommunication lines-data lines connecting cold room and the storekeeper's desk and a telephone line at the desk.
4) Minimise risk of fire by installing fire extinguishers.
5) Install smoke detectors and sprinklers in the vaccine storage areas.
6) Build a hanger along the front of the OPD building.
7) Install two water-resistant electrical sockets on the wall under the hanger.
8) Install benches for icepack conditioning and packaging.

9) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

4.9.5. Conclusion

The proposed installation site is small in size and is just sufficient to commission the WIC. However, it is not possible to implement the cold store standards as per the WHO guidelines. Substantial civil work has to be undertaken before the WIC can be installed. Reliable power supply is the primary factor that recommends installation of the cold room at this site.

4.10. BIKANER, RAJASTHAN

4.10.1. Observations

The proposed site is located in the premises of Swasthya Bhawan, Tyagi Vatika, Station road, Bikaner 334001, Rajasthan. The proposed location has been constructed to host the new WIC.

UNICEF has scheduled to install a 30 m^3, WIC, HUURRE at this site which will require an area of 4.5 m x 3.6 m. The size of the proposed location is 6.6 m x 5.25 m.

See Figure 25 for a general layout of the Bikaner proposed site for WIC.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The current vaccine store operates from the RCH office, opposite to PB hospital. The new site is located about 8 Km away from the current store. The vaccine store would be permanently shifted to Swasthya Bhawan after the installation of WIC.
2) The room has been especially constructed as per the UNICEF guidelines. However, due to lack of space, the storekeeper's office cannot be accommodated here.
3) The site is yet to receive the WIC; however, the 15 KVA generator and the Servo stabilizer have been supplied. The generator is currently stored in the room meant for the WIC.
4) The refrigeration mechanic, Mr Nand Kumar Vyas, has overseen the construction and furnishing of the room to ensure that the requirements have been met. A room attached to the proposed location for the WIC has been allotted to install the generator. The electrical distribution panel along with the circuit breakers and change-over switch have already been installed.

5) A separate room has been constructed next to the WIC room for the cold-chain refrigeration workshop. This room should be converted into the storekeeper's office. This room can also accommodate the consumables and the DFs.
6) The site does not have a dedicated three-phase power supply line for the cold room. Mr. Vyas has suggested drawing the electrical line drawn from the state electricity board transformer close to the Swasthya Bhawan.
7) Telephone lines are available within seven days of advance notice.
8) The proposed room is adjacent to the drug warehouse, which is managed by the store in-charge, Mr Inder Singh. His office is located within the store. The store could also double up as the vaccine storekeeper's office.
9) The site is ready for installation of WIC, subject to availability of power supply and completion of the minor civil work recommended in the Section 4.10.3.

4.10.2. Site status

- ❑ Water supply and sanitary facilities

The proposed location has water supply. A sink is available for washing/cleaning, and provision has been made to evacuate water into an underground drain. A separate washroom has been constructed next to the WIC room.

- ❑ Drainage

The room is well drained since provisions for drainage have been taken into consideration during the construction. Constructing a raised plinth on which the WIC can be mounted will prevent eventual corrosion and safeguard against possible flooding. To pour the plinth the floor-loading capacity would need to be assessed.

- ❑ Lighting

The proposed location has one large window, one ventilation window and a large shutter gate, which contribute to adequate lighting. There is no exposure to direct sunlight at the packing area.

- ❑ Ventilation, heating and cooling

The location proposed for the WIC has a ceiling height of more than 4 m. It is well ventilated, with 1 large door (1.8 m wide and 2.4 m high), 1 large window and 1 ceiling window on the wall opposite to the door. There are no extractor fans but there is a provision for installing one.

The room may require cooling during the summer and heating during the winter. This requirement can be met with a 2-ton air conditioner and a warm-air dispenser.

- ❑ Communications

There are no telephone lines at present in the proposed room. However it was suggested that a phone and data line would be available in a week's notice.

The telephone and telecommunications lines should be drawn so that the storekeeper's office line can eventually handle data transfer and the cold room lines can be linked to the temperature alarms and used for computerised monitoring.

- Security

The cold store facility is housed in a secured compound with guard services. The room is lockable. Security threat with respect to theft or vandalism is considered very low. But security risks with respect to fire are high as there are no fire extinguishers installed in the room.

- Vehicle access and loading convenience

Vehicle can easily dock at the platform located near the gate of the store. The vaccine can be directly loaded into vehicle from the packing area. There is ample parking space. The building has direct main road access.

- Security during loading

The site is adequately secured for vaccine loading due to the presence of a dock station. The vaccine boxes are directly loaded into the vehicle from the store.

- Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of building or loading point.

- Loading dock

A loading dock has been constructed adjacent to the storeroom's exit. It is constructed at a height of 1.06 m from the ground level.

- Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area or the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

There is no room for the storekeeper's office. Officials have yet to finalize a suitable location for the storekeeper's office in Swasthya, Bhawan. The layout for the office is shown in Figure 25.

- Packing area

There is a space available of 2 m X 4 m next to the door of the proposed room. This space should be used for ice-pack conditioning and vaccine packing.

- Proposed WIC

A space of 4.5 m x 3.6 m has been assigned at proposed location for assembling the 30 m^3 WIC. . It should be assembled 0.6 m away from the rear and sidewalls to allow easy access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 cm to 10 cm thickness needs to be poured to provide a base for the WIC. Figure 25 shows the placement of the WIC.

It is to be noted that there is no scope of installing the ILRs and DFs in the room.

- ❑ Storage of consumables

A separate room with limited access has been constructed for the storage of consumables. This may be risky to store diluents.

- ❑ Backup generator

A room with adequate size and location is available to house the new 15 KVA generator and the stabilizer. The electrical distribution box has been mounted.

But there are two problems with the generator room:

The door is 1.05 m in size, which prevents easy manipulation of the generator into the room. By removing the door from it hinges, there will be ample space to shift the generator.

The generator room is accessed through WIC room. Once the WIC is installed, the generator will no longer be accessible for major repair or replacement. This constrain could be addressed by creating another door in the generator room with direct access to the road.

- ❑ Power situation and stability

Power supply has been reportedly stable at the Swasthya Bhawan and power cuts have been negligible. A dedicated three-phase power line will be drawn from the nearby transformer.

- ❑ Electrical safety

The electrical wiring and fittings meet the standard requirements. There is a very low risk of a fire breaking out from the electrical wiring and fittings.

- ❑ Circuits with correct rating

Circuits have been fitted with proper rating at the distribution and change over panel mounted in the generator room.

4.10.3. Recommendations linked to installation of cold room

1) The three-phase auto-start generator supplied by UNICEF needs to be installed to ensure power backup to the new WIC.
2) A wide door needs to be built in the generator room to allow the transport of the generator for major repairs. The door should open on to the road, enabling direct access to the room. The current entrance, which opens into the room hosting the WIC, should be used only to operate the generator.

3) A new three-phase 50 A electrical line should be drawn from the electrical transformer near to the building. This line should be drawn directly to a metering and distribution panel mounted near the generator set.
4) New three-phase distribution lines should be drawn from this distribution panel to WIC. The panel should also be connected through an auto-start to the generator.
5) A reinforced concrete slab in the form of a raised plinth of 6 cm to 10 cm thickness should be poured where the WIC is to be placed. It will reduce the risk of inundation due to flooding and corrosion when the floors are washed.

4.10.4. Recommendations as per guidelines, not linked to installation of cold room

1) Allocate the room next to WIC for storekeeper office. This room is presently assigned as a refrigeration workshop.
2) Create lockable partition in the proposed storekeeper's office to store consumables.
3) Install two telecommunication lines (data lines at the store keeper's desk).
4) Provide shelves in the storage room.
5) Furnish the storekeeper's office as per the layout suggested in Figure 25 and include a secure lockable cabinet to keep records.
6) Minimise risk of fire by installing fire extinguishers in WIC room, generator room and storekeeper's office.
7) Install smoke detectors and sprinklers in the vaccine storage areas.
8) Build a hanger along the loading dock outside the cold store.
9) Install two water-resistant electrical sockets on the wall under the hanger.
10) Install benches for icepack conditioning next to vaccine packing area at the proposed site.
11) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

4.10.5. Conclusion

The officials have made the best use of the available resources and facilities to plan and prepare the site for the WIC installation. The proposed site for the

WIC has insufficient space to house a vaccine store; however, there are other rooms next to the proposed site, which should be allotted to the vaccine store.

Apart from the dedicated three-phase electrical line and minor civil work, the site is ready for installation. The power lines can be drawn with a one-week's notice prior to installation of the cold room.

4.11. KOLKATTA, WEST BENGAL

4.11.1. Observations

The Medical Store Depot, Hastings, Clide row, Kolkatta is one of the 4 MSD's in India. The facility has large vaccine storage facility, including 3 WIFs, 3 cold rooms of old construction with concrete walls. Two of the currently installed WIFs were reported to be malfunctioning. The cooling units of these 2 WIFs were found to be defective. UNICEF has supplied 4 new cooling units to replace the faulty ones.

The site has received the cooling units and they are store at that location.

4.11.2. Status of WIF

1) One of the two WIFs in need of cooling units replacement is operational but rarely used. The body of the cold room is in good condition. There is ample space available next to the WIF to carry out repair and replacement of units. The units can be replaced immediately.
2) The other WIC is in poor condition. The body of the freezer room has rusted and there are several cracks visible in its walls. There is evidence of repair and filling of cracks with silicone. However, the WIF is not in an operational condition. Therefore, its cooling units should not be replaced. Refer to images in Section 6.11.
3) The third WIF, which is operational, has ice formation at the evaporator. Currently, the storekeeper alternates the use of these units. As a unit is used, the other is defrosted.
4) There is no operational generator for cold rooms at the site. A 50 KVA generator is awaiting installation.

4.11.3. Recommendations

1) Replace the cooling units of first WIF.
2) Replace the entire freezer room (WIF 2) with a new one as the body of the WIF has rusted.
3) Install the 50 KVA generator to provide back to these cold room. Generator should be connected through a central distribution system with individual circuit breakers for each room.

4) Re-program the third WIF cooling unit in such a way that the defrosting cycle is adequately timed. Defrosting allows the ice to melt, and prevents blockage of draining pipe. Also align the placement of the sensor at the evaporator unit in such a way that defrosting happens before ice forms, and align the plate underneath the evaporator to ensure that the water flows out through the drain pipe and does not stagnate in the tray.

4.11.4. Conclusion

One of the two WIFs can be replaced immediately. The second unit needs to be subject to a life-cycle feasibility analysis by a qualified engineer; till then it is advisable not to replace the cooling units of this WIF. The generator should be installed on a priority basis as there is no power backup at the store.

5. CONCLUSION

The key conclusions that can be drawn after assessing all the eleven sites are as follows:

1) It is not possible to implement the WHO-recommended vaccine store standards, because the proposed locations cannot accommodate the requirements.
2) Cold and freezer rooms can be installed and commissioned at all the locations subject to completion of electrical and civil work. Major construction work has to be undertaken at two locations, Pune and Jabalpur, before the cold rooms can be housed.
3) It is unlikely that the locations at Pune, Jabalpur, Belgaum and Meerut will be ready for installation within the timeframe of the contract awarded to ITPI. The installation period for these sites will have to be extended.

ANNEXURE

1. LOCATIONS FOR INSTALLATION OF COLD ROOMS

With reference to the special agreement mentioned above, followings sites were assessed prior to installation of cold rooms. Table 2 gives the list of sites along with specifications of cold room(s) to be installed at these sites.

Table 2: Site locations and cold room specifications

No.	State	City	Site address	Specifications of cold room
1	Maharashtra	Mumbai	UNICEF Supplies Store DADGC Stores, Government Medical Stores Depot, Mumbai Central – 400 008, Maharashtra	WIC, 30 M3, HUURRE WIF, 20 M3, HUURRE
2	Maharashtra	Pune	Kutumb Kalyan Bhawan Pune , Maharashtra	WIF, 20 M3, HUURRE
3	Karnataka	Belgaum	District Health & Family Welfare office, Assistant Director, Vaccine Institute, Tilakwadi Belgaum Central – 590 006, Karnataka	WIC, 30 M3, HUURRE
4	Karnataka	Gulbarga	District Health and Family Welfare Office, Gulbarga	WIF, 20 M3, HUURRE
5	Tamil Nadu	Cuddalore	Deputy Director, Health services, Beach Road, Near high court, Cuddalore, Tamil Nadu	WIC, 30 M3, HUURRE
6	Orissa	Bolangir	Leprosy Building, near warehouse (medical store), Bolangir, Orissa	WIC, 30 M3, HUURRE
7	Madhya Pradesh	Jabalpur	Office of Regional Director, Near Indira Market, Railway station line, Jabalpur, Madhya Pradesh	WIC, 30 M3, HUURRE
8	Uttar Pradesh	Meerut	Lala Lajpat Rai Medical college, Garh Road, Meerut, Uttar Pradesh	WIF, 20 M3, HUURRE WIC 30 M3, HUURRE
9	Uttar Pradesh	Allahabad	Motilal Nehru District Hospital, OPD ward, Allahabad, Uttar Pradesh	WIC, 30 M3, HUURRE
10	Rajasthan	Bikaner	Swasthya Bhawan,	WIC, 30 M3,

No.	State	City	Site address	Specifications of cold room
			Tyagi Vatika, Station road, Bikaner 334001, Rajasthan	HUURRE
11	West Bengal	Kolkatta	Medical Store Deport, No 9, Clide Row, Hastings, Kolkatta	4 cooling units (HUURRE) for 2 WIF, 20 M3 each freezer room

2. SCHEDULE OF ASSESSMENT AND OFFICERS MET

The site assessment was carried out between 19 June 2007 and 12 July 2007. Table 3 lists the schedule of assessment carried out at each site. Table also includes the names of officers met at the site.

Table 3: Schedule of site assessment and officer met on site

No.	State	City	Date site assessed	Name and designation of officers met
1	Maharashtra	Mumbai	20 June 2007	Mr. D S Rao (Deputy Assistant Director, Director General) Mr B R Pagare (Senior Superintendent)
2	Maharashtra	Pune	21 June 2007	Mr. V B Abhane (State Cold Chain Officer) Major Dr. Pradeep Yashwant Gaikwad *(Assistant Director, FW)*
3	Karnataka	Belgaum	22 June 2007	Mr. T. H. Kabade (Mechanical class 1, Engineer)
4	Karnataka	Gulbarga	23 June 2007	Dr. Nalini Namoshi (District Health and Family Welfare officer) Dr. Shyam Rao Patil (District RCH Officer) Mr. Mohammed Mansoor Ahmed (Cold Chain Maintenance Wing) (incharge of Bigar, Gulbarga, Raichur, Koppal) Mr. Vithal H bawgi (Refrigeration Mechanic, Cold chain)
5	Tamil Nadu	Cuddalore	26 June 2007	Jothi Ramajayam (Administration officer) T Ramamurthy (Health Inspector)
6	Orissa	Bolangir	28 June 2007	Dr Sharad Chandra Mishra (Chief Medical Officer) Suresh Chandra Jena (State Cold Chain Officer) Himanshu Ranjan Kar (District program Manager)
7	Madhya Pradesh	Jabalpur	30 June 2007, 2 July 2007	Dr Kaushlesh Shukla (Joint Director) Dr. Shafadullah Khar, (Deputy Director, FW.)
8	Uttar Pradesh	Meerut	19 June 2007	Dr. M K Gupta (Additional Director, Health and Family Welfare) Dr. S K Jain, (Assistant Additional Director, Health and Family Welfare) Mr. Anil Kumar *(Store Keeper)*
9	Uttar Pradesh	Allahabad	3 July 2007	Dr G C Shrivastava (Additional Director) Harish Chandra (Refrigeration Mechanic) Anjali Pandey (Store incharge)

No.	State	City	Date site assessed	Name and designation of officers met
10	Rajasthan	Bikaner	10 July 2007	Dr S L Godara (RCH officer) Deepak Goswami (Statistical officer) Nand Kumar Vyas (Refrigeration Mechanic) Inder Singh (Store in-charge)
11	West Bengal	Kolkatta	12 July 2007	MR Arbindo Roy (Senior Store Superintendent.) Vijay Kumar Jha (UDC) Basanta Kumar Hens (Pharmacist)

3. SEQUENTIAL ORDER OF INSTALLATION

Based on the preparedness of the sites for installation of cold rooms, Table 4 lists the preferred order of installation of cold rooms subject to completion of work requested for each site.

Table 4: Sequential order of cold room installation

Order	State	City	Site address	Specifications of cold room
1	Rajasthan	Bikaner	Swasthya Bhawan, Tyagi Vatika, Station road, Bikaner 334001, Rajasthan	WIC, 30 m^3, HUURRE
2	Karnataka	Gulbarga	District Health and Family Welfare Office, Gulbarga	WIF, 20 m^3, HUURRE
3	West Bengal	Kolkatta	Medical Store Deport, No 9, Clide Row, Hastings, Kolkatta	4 cooling units (HUURRE) for 2 WIF, 20 m^3 each freezer room
4	Tamil Nadu	Cuddalore	Deputy Director, Health services, Beach Road, Near high court, Cuddalore, Tamil Nadu	WIC, 30 m^3, HUURRE
5	Orissa	Bolangir	Leprosy Building, near warehouse (medical store), Bolangir, Orissa	WIC, 30 m^3, HUURRE
6	Uttar Pradesh	Allahabad	Motilal Nehru District Hospital, OPD ward, Allahabad, Uttar Pradesh	WIC, 30 m^3, HUURRE
7	Uttar Pradesh	Meerut	Lala Lajpat Rai Medical college, Garh Road, Meerut, Uttar Pradesh	WIF, 20 m^3, HUURRE WIC, 30 m^3, HUURRE
8	Maharashtra	Mumbai	UNICEF Supplies Store DADGC Stores, Government Medical Stores Depot, Mumbai Central – 400 008, Maharashtra	WIC, 30 m^3, HUURRE WIF, 20 m^3, HUURRE
9	Karnataka	Belgaum	District Health & Family	WIC, 30 m^3,

Order	State	City	Site address	Specifications of cold room
			Welfare office, Assistant Director, Vaccine Institute, Tilakwadi Belgaum Central – 590 006, Karnataka	HUURRE
10	Maharashtra	Pune	Leprosy building, Kutumb Kalyan Bhawan Pune , Maharashtra	WIF, 20 m^3, HUURRE
11	Madhya Pradesh	Jabalpur	Office of Regional Director, Near Indira Market, Railway station line, Jabalpur, Madhya Pradesh	WIC, 30 m^3, HUURRE

4. COLD ROOM DRAWINGS

4.1. WIC, 30 M^3, HUURRE

4.1.1. Layout of cold room

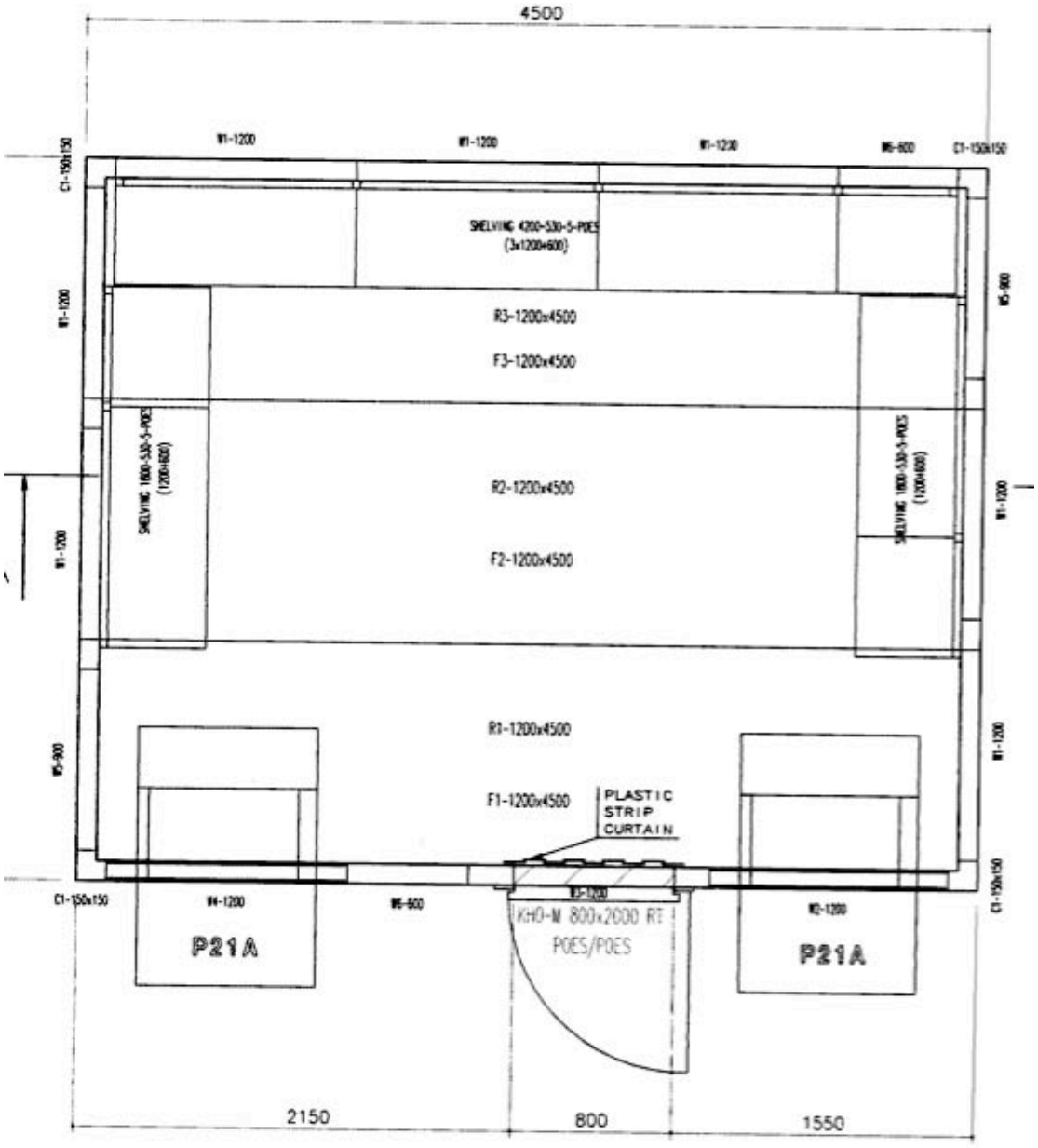


Figure 4: Layout of 30 m^3 WIC

4.1.2. Placement of shelves in 30 m^3 WIC

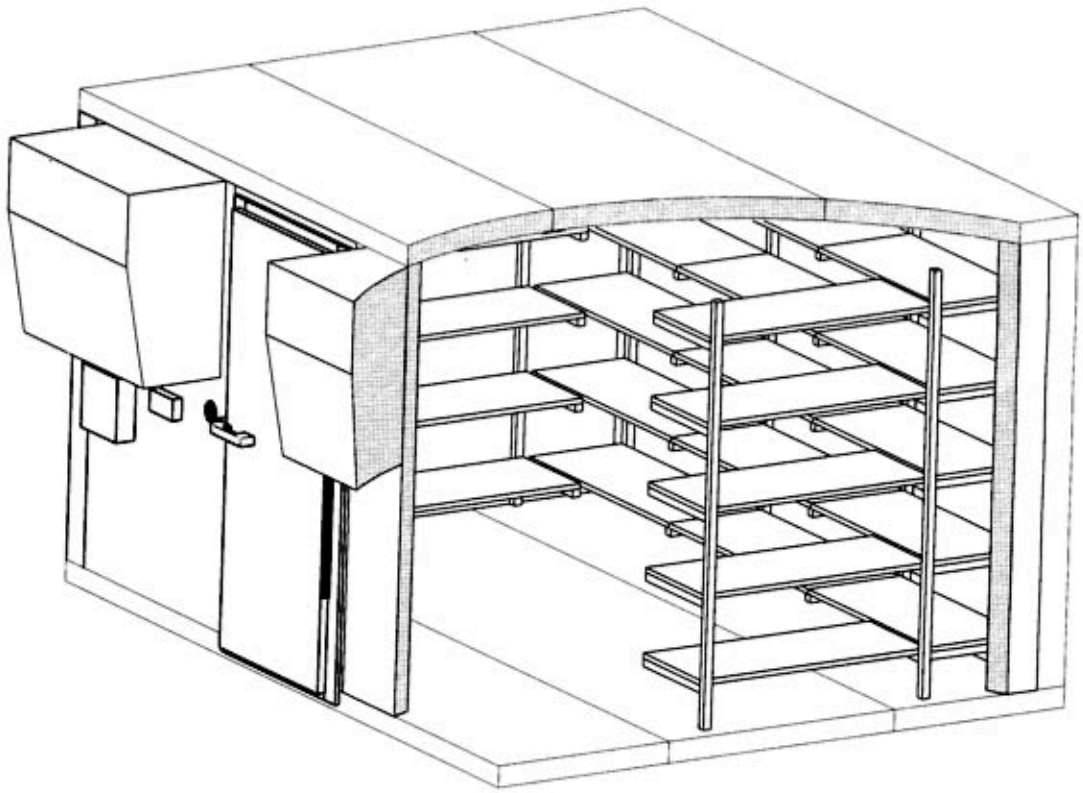


Figure 5: Placement of shelves in the 30 m^3 WIC

4.1.3. Side view of shelves in 30 M3 WIC

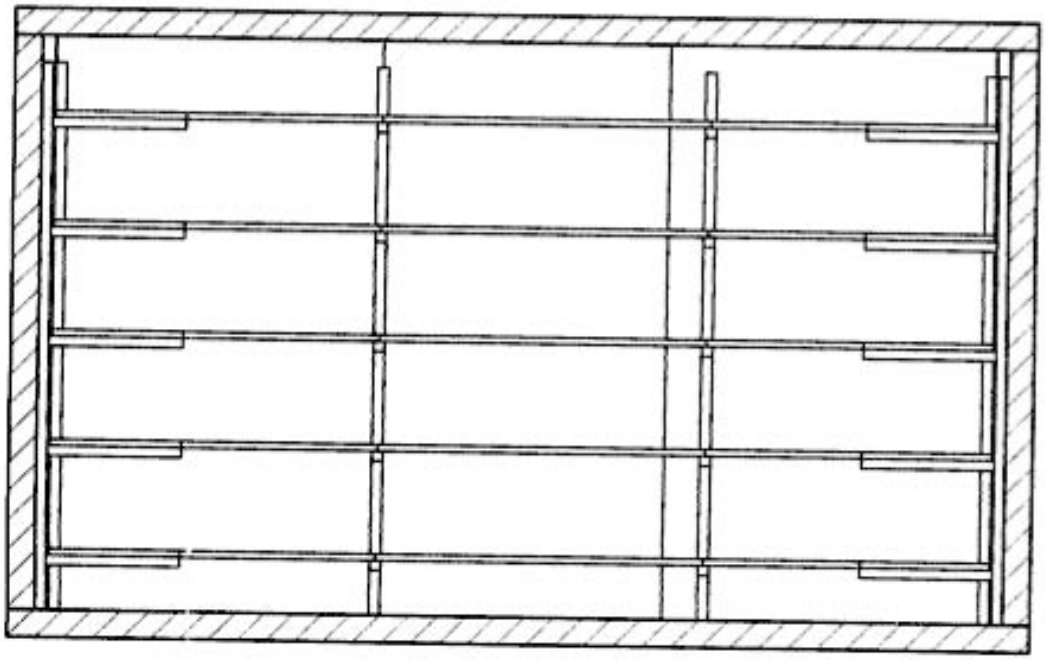


Figure 6: Side view of shelves inside the 30 m^3 WIC

4.1.4. Front view of WIC 30 m^3 size

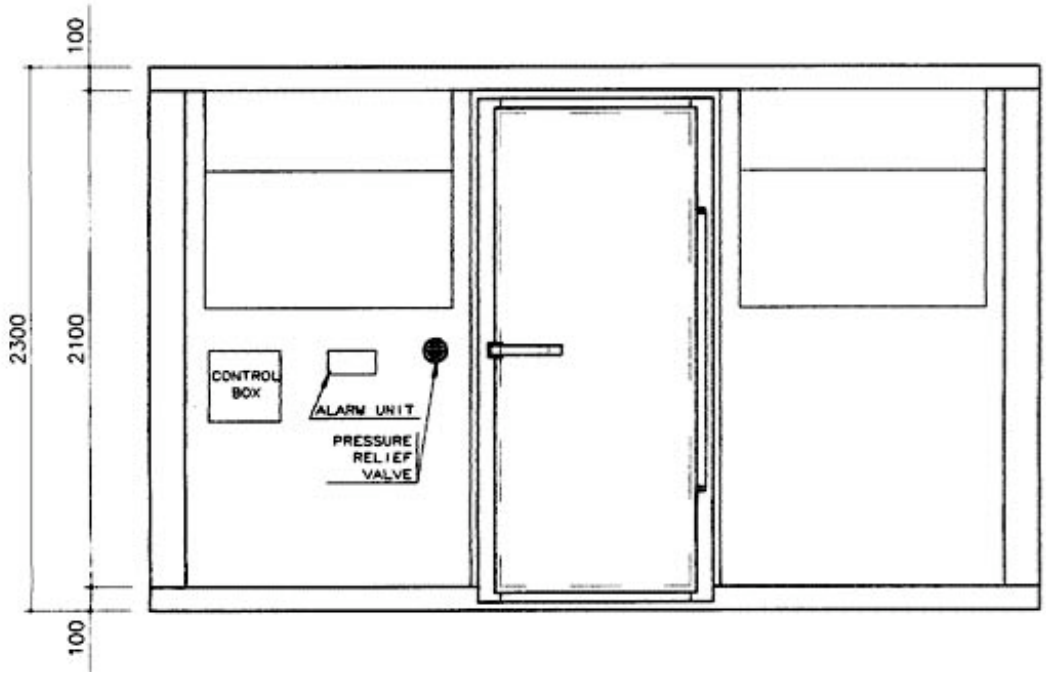


Figure 7: Front view of 30 m^3 WIF (Dimensions in Cms)

4.2. WIF, 20 M^3, HUURRE

4.2.1. Layout of freezer room

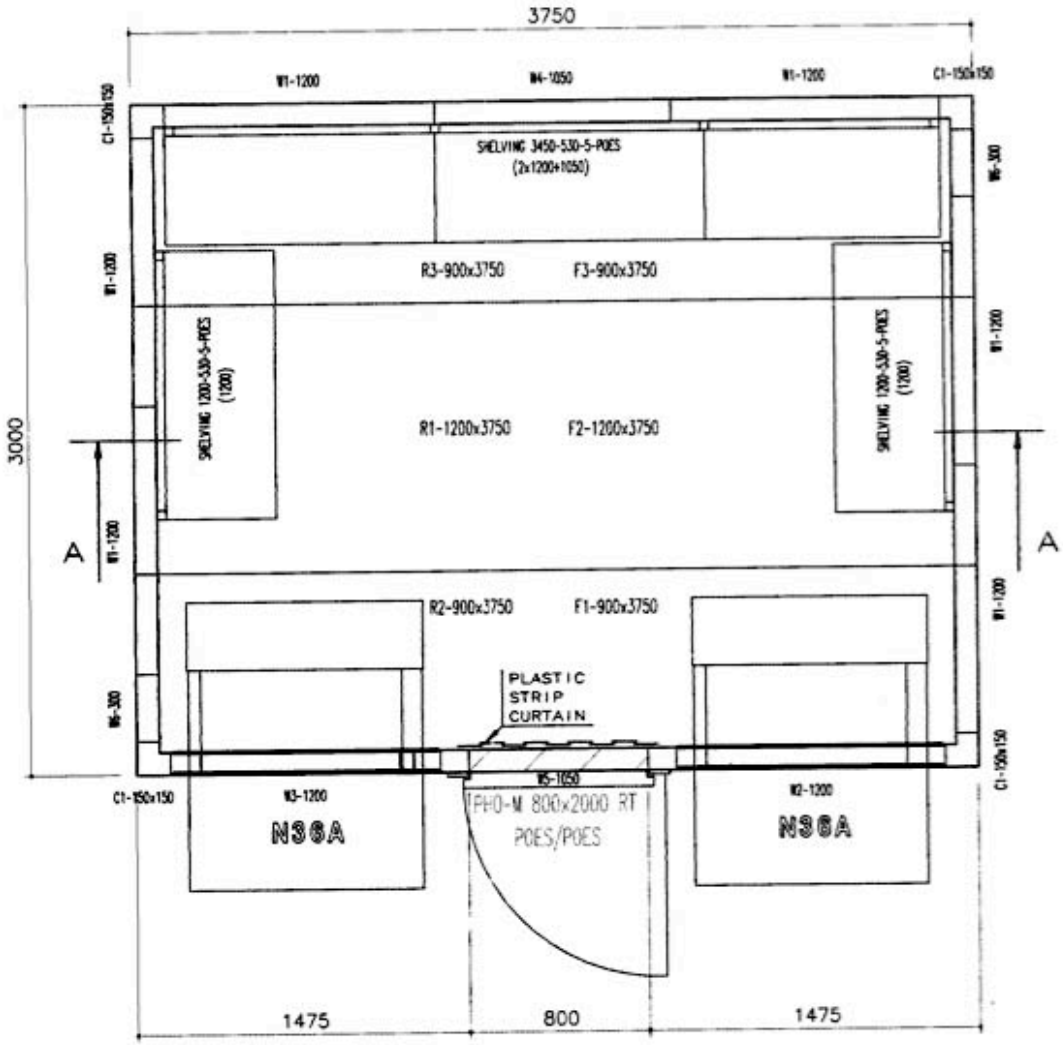


Figure 8: Layout of freezer room (WIF, 20 m^3)

4.2.2. Placement of shelves in 20 m^3, WIF

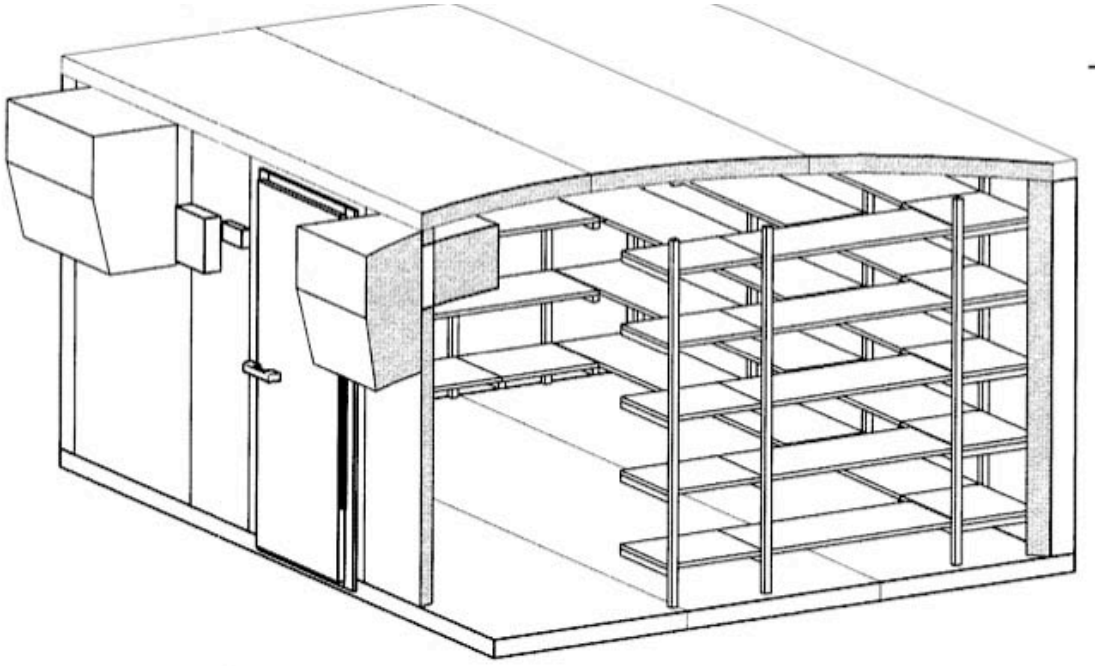


Figure 9: Placement of shelves in WIF 20 m^3

4.2.3. Side view of shelves in 20 m^3 WIF

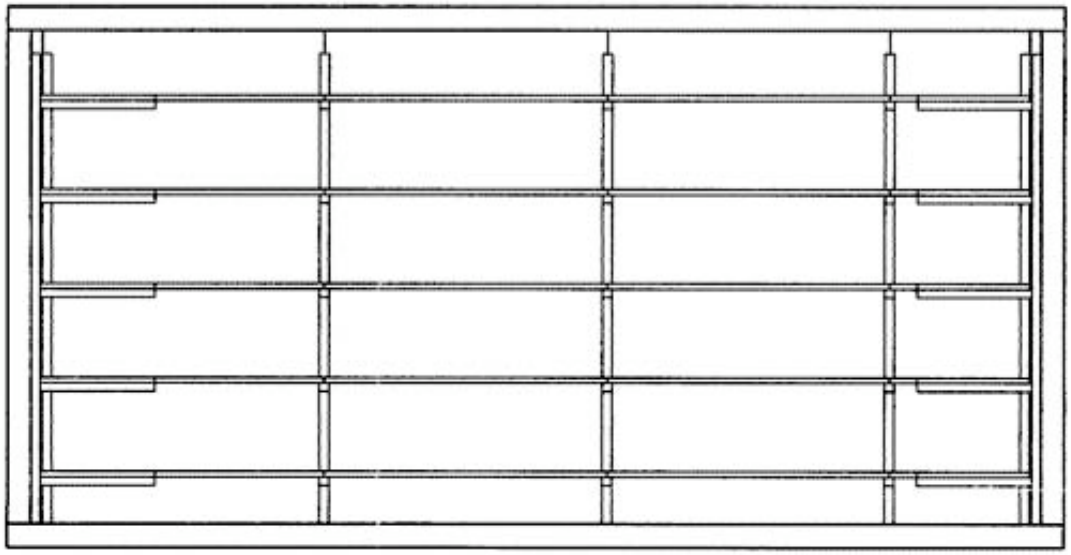


Figure 10: Side view of shelves in 20 m^3 WIF

4.2.4. Front view of WIF, 20 m^3 Size

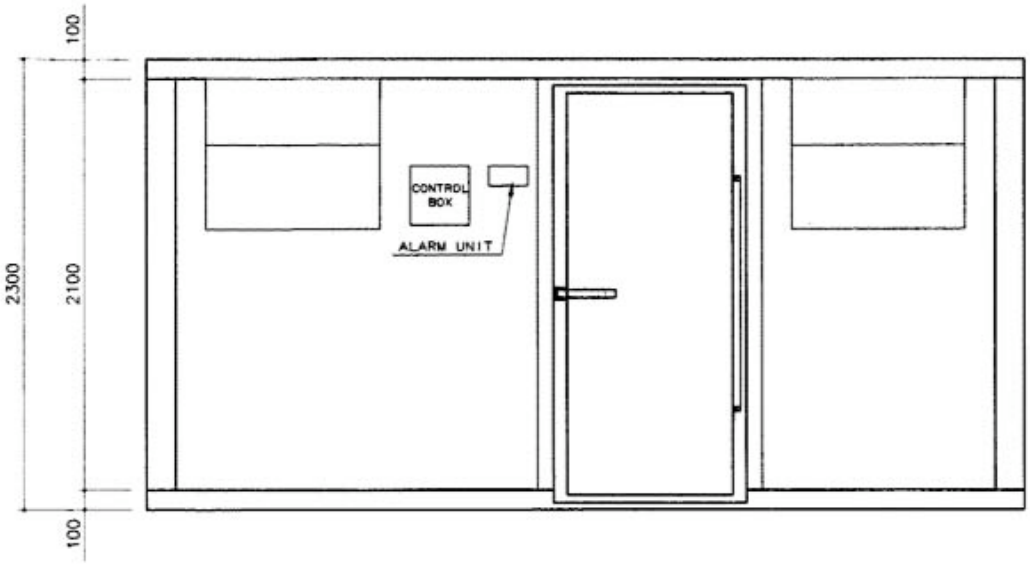


Figure 11: Front view of WIF, 20 m^3 size

5. SITE DRAWINGS

5.1. MEERUT, UTTAR PRADESH

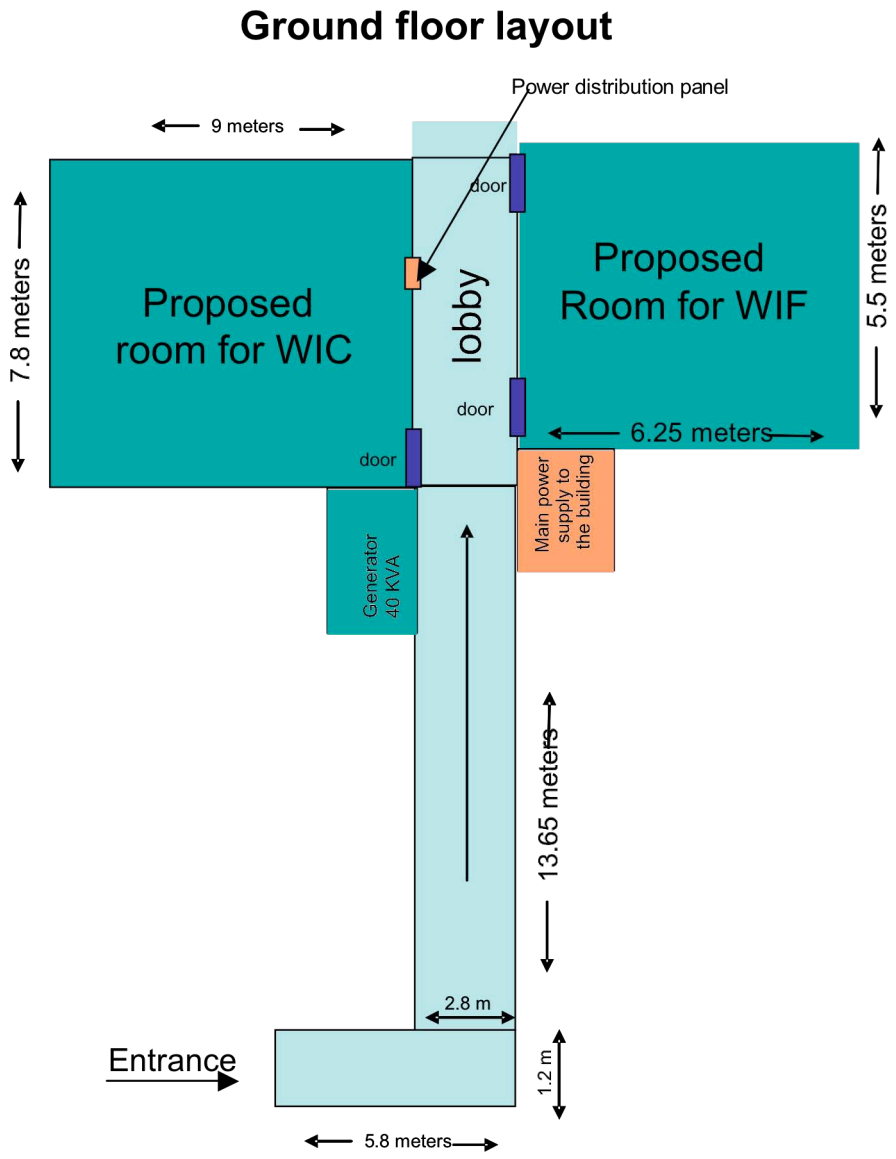


Figure 12: Layout of Meerut cold store facility (ground floor) and suggested locations for the new WIF and WIC

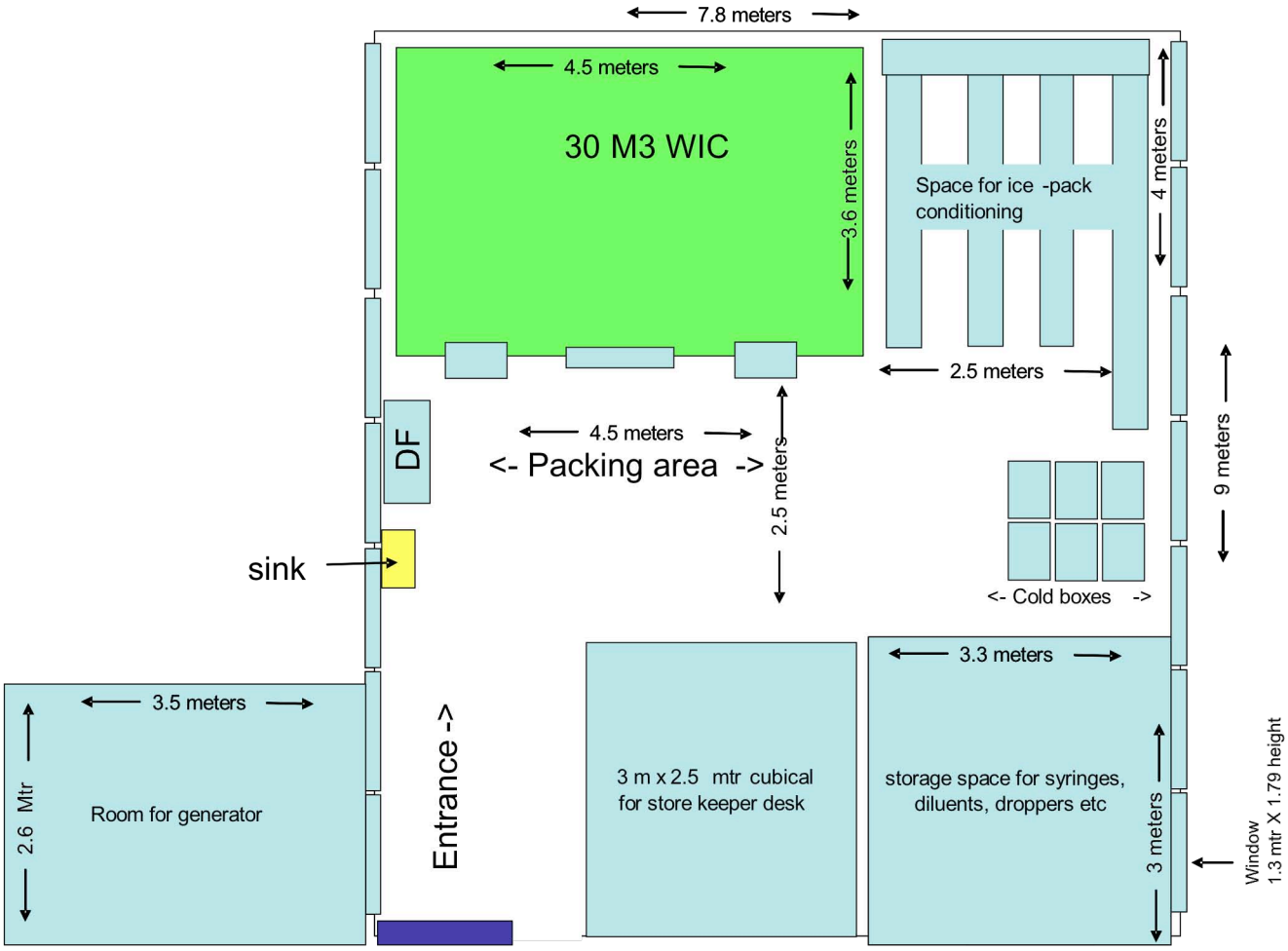


Figure 13: Proposed location (A) for installation of WIC

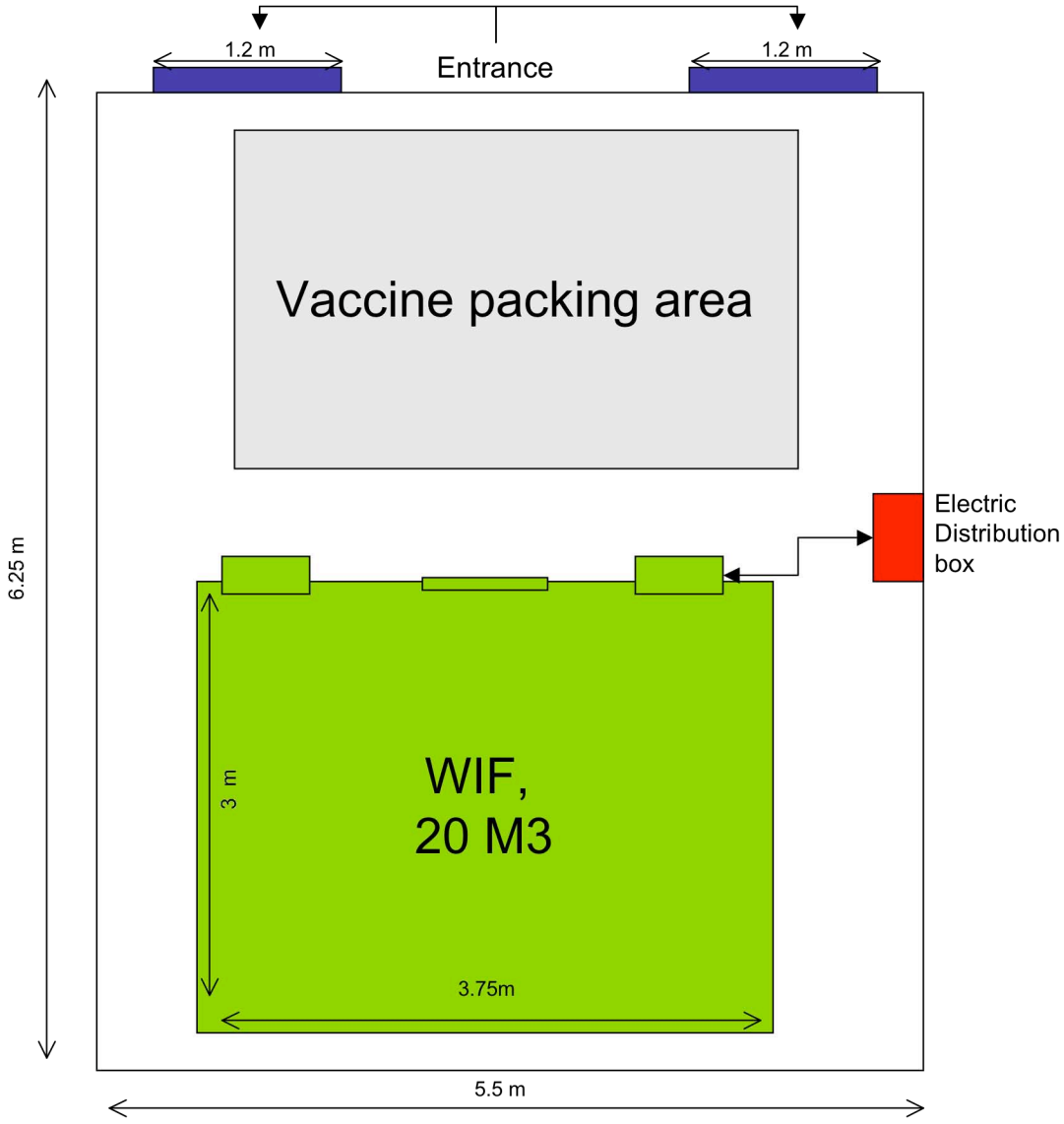


Figure 14: Layout of location "C" to host WIF

5.2. MUMBAI, MAHARASHTRA

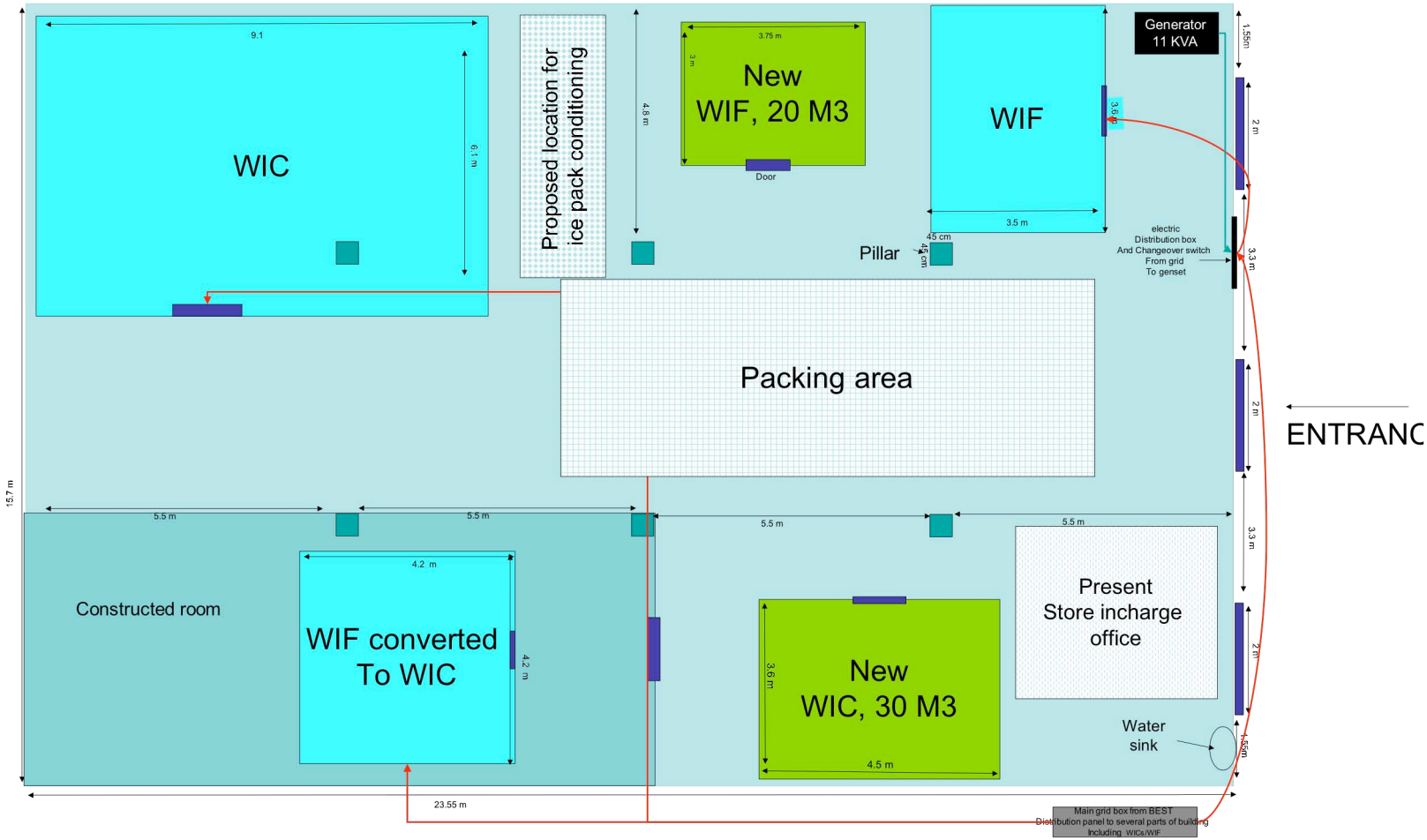
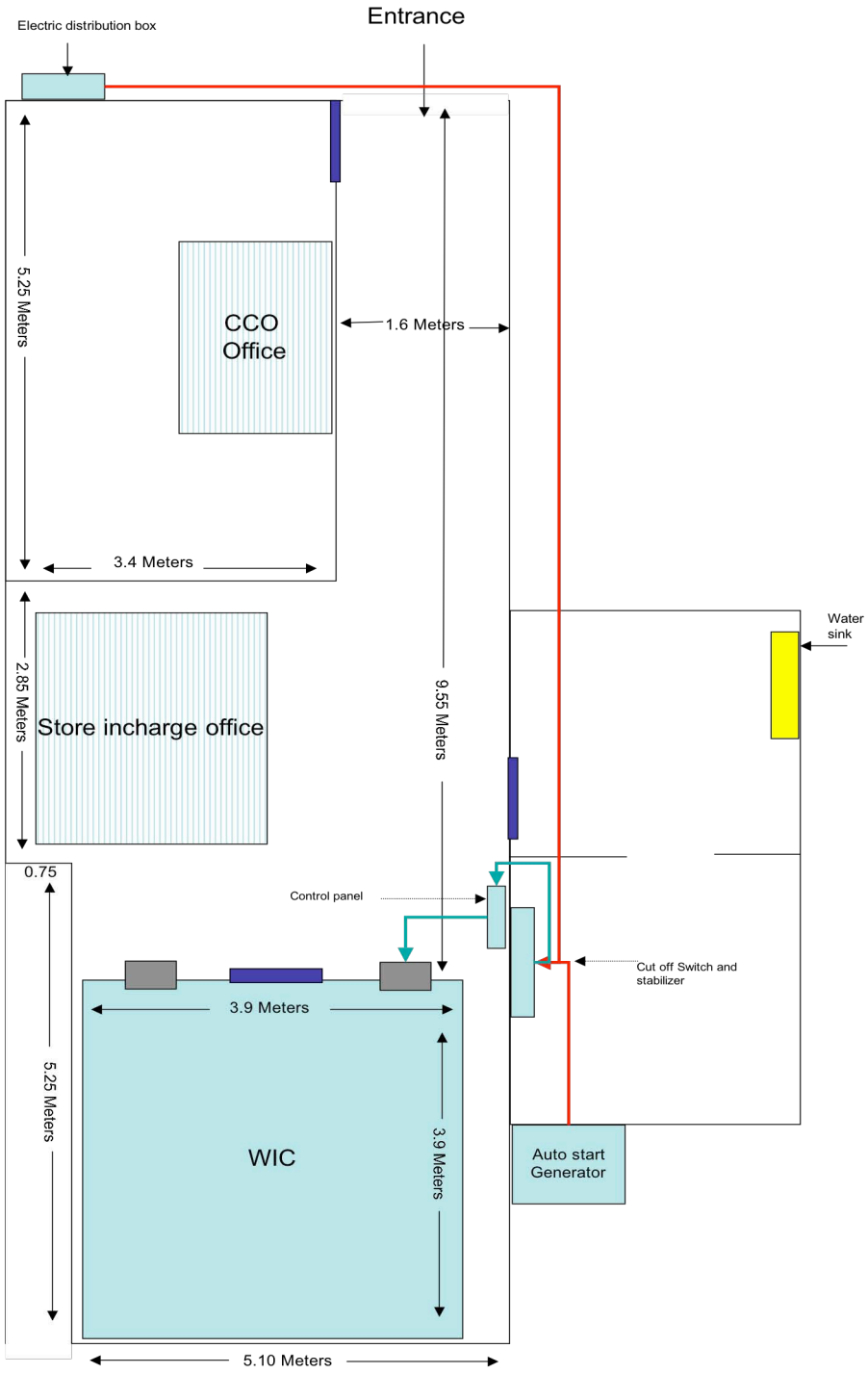


Figure 15: Layout of Mumbai cold store facility (ground floor) and suggested locations for the new WIF and WIC

5.3. PUNE, MAHARSHTRA

Figure 16: Present layout of Pune vaccine store facility



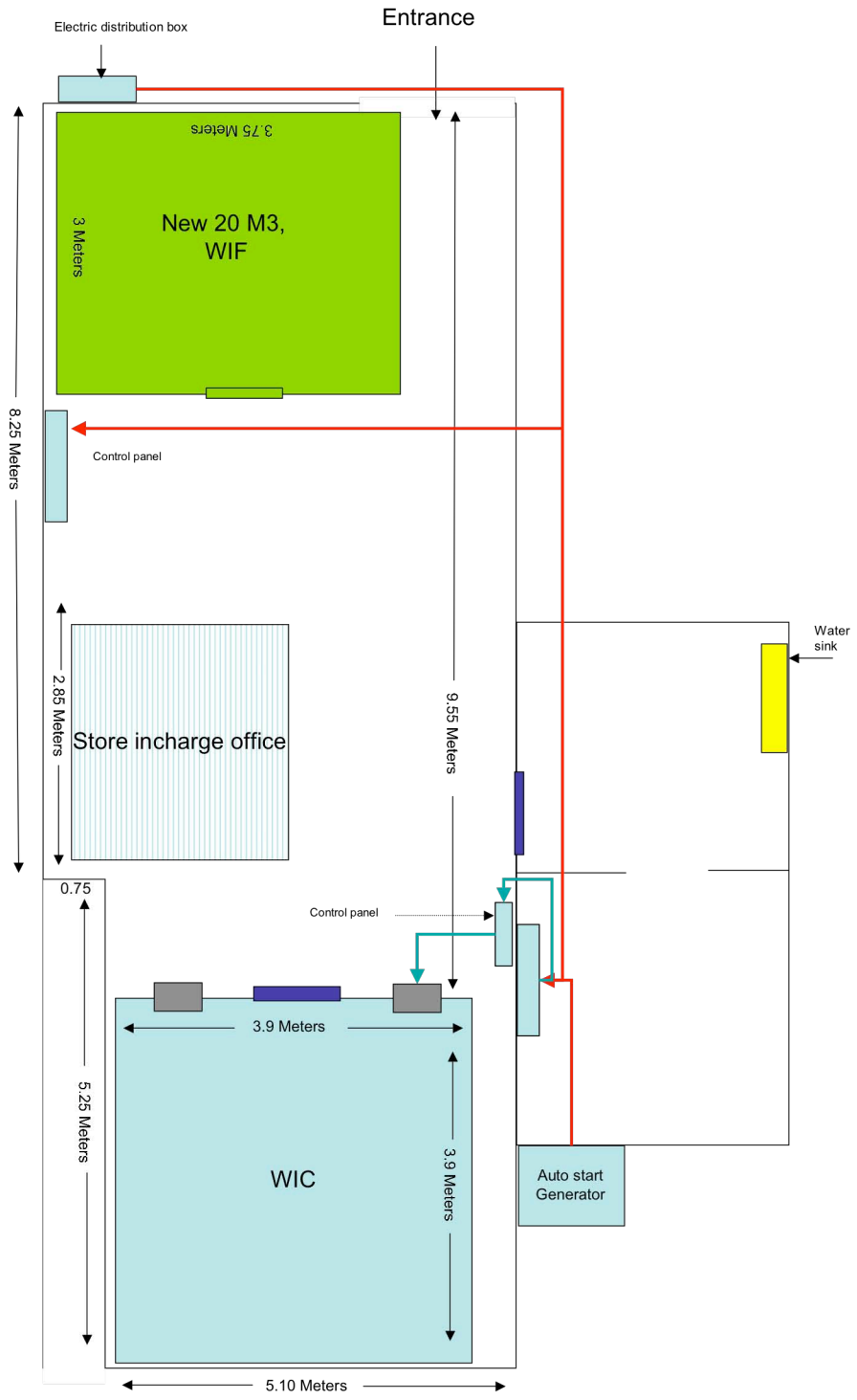


Figure 17: Proposed alteration and suggested placement of 20 m^3 WIF

5.4. BELGAUM, KARNATAKA

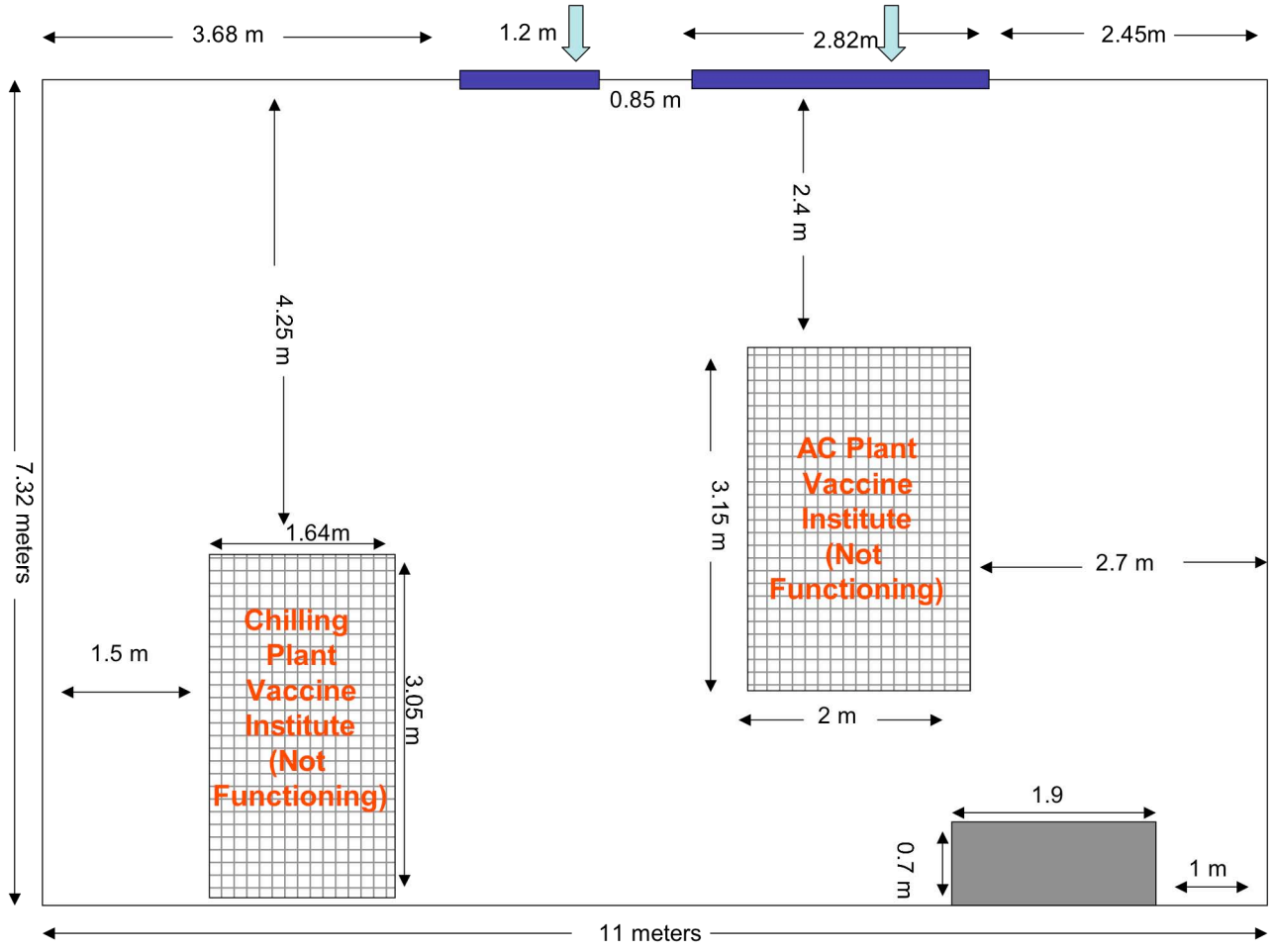


Figure 18: Present layout of proposed site for 30 m^3 WIC

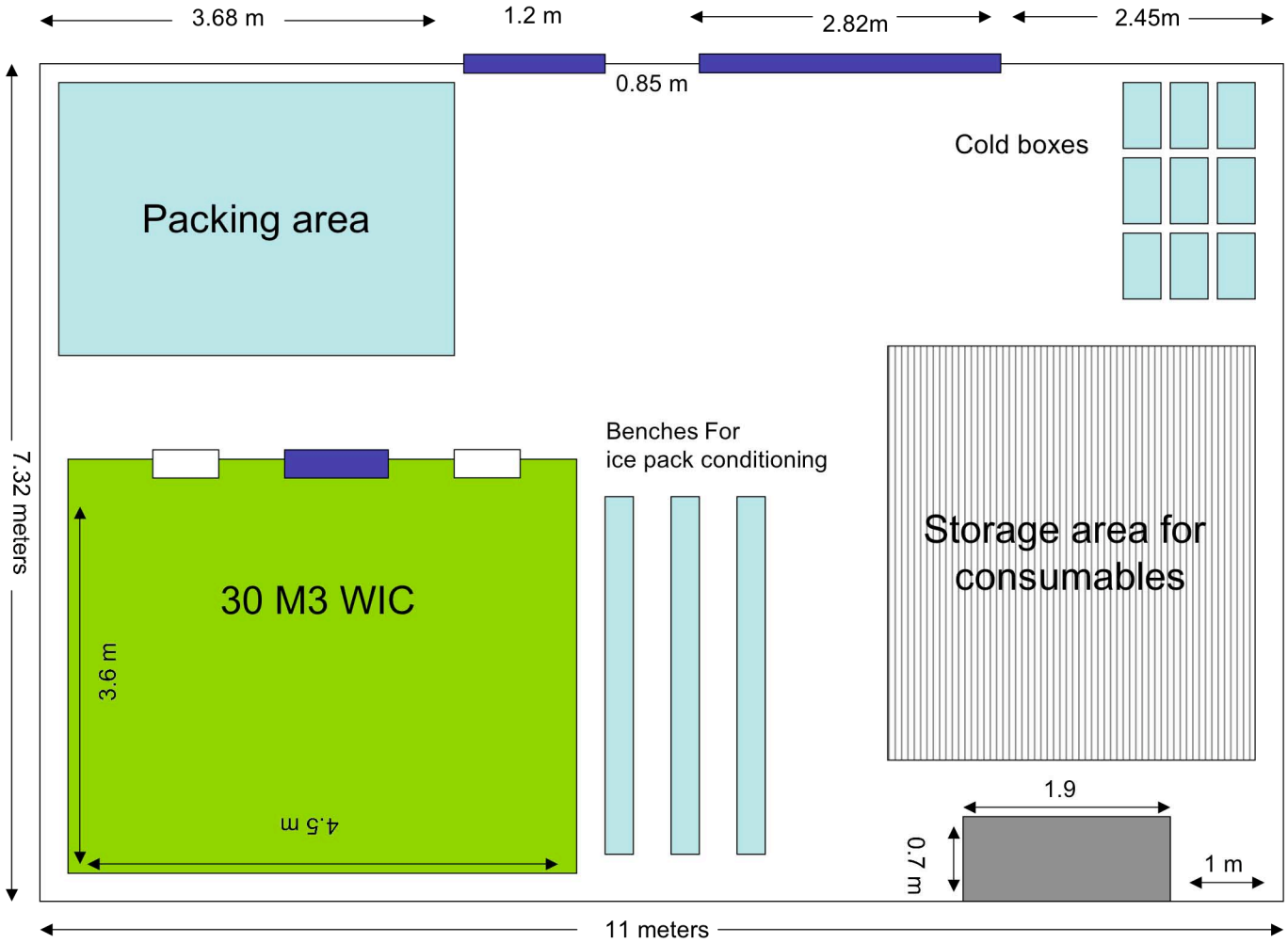


Figure 19: Suggested layout of store (with removal of chiller and AC plant)

5.5. GULBARGA, KARNATAKA

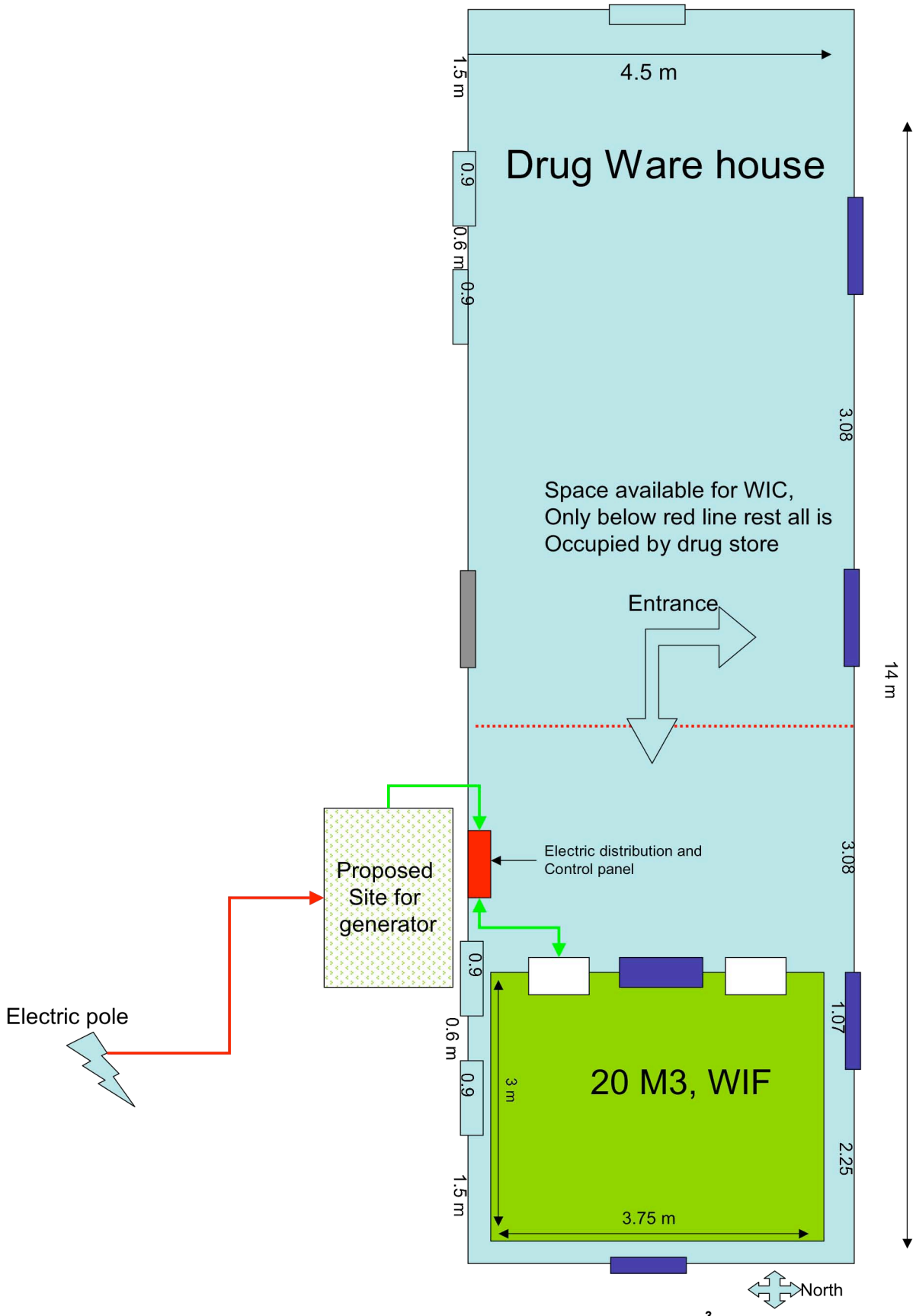


Figure 20: Layout of site proposed for installation of 20 m^3, WIF

5.6. CUDDALORE, TAMIL NADU

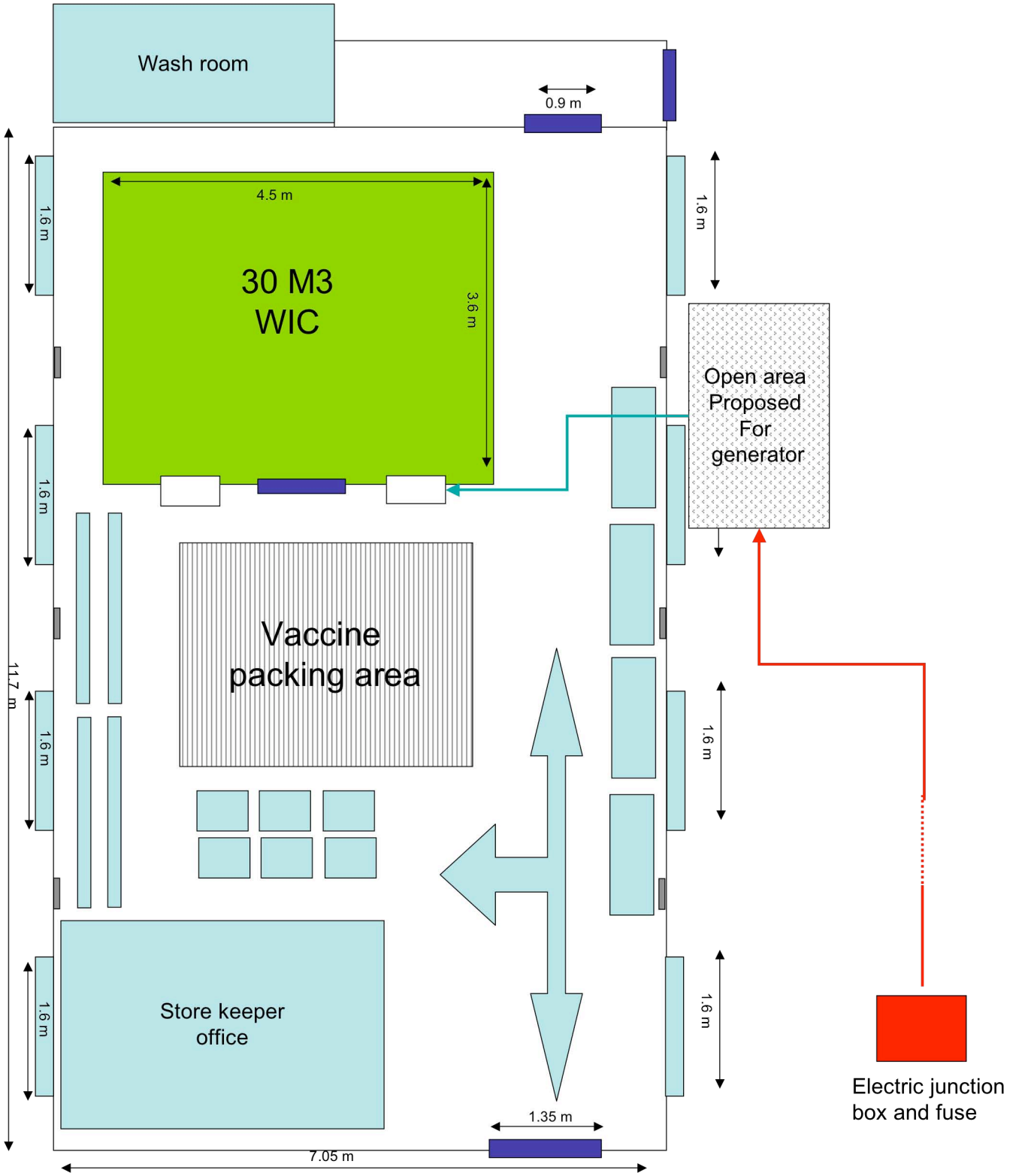


Figure 21: Proposed layout for store room of Cuddalore and position of WIC

5.7. BOLANGIR, ORISSA

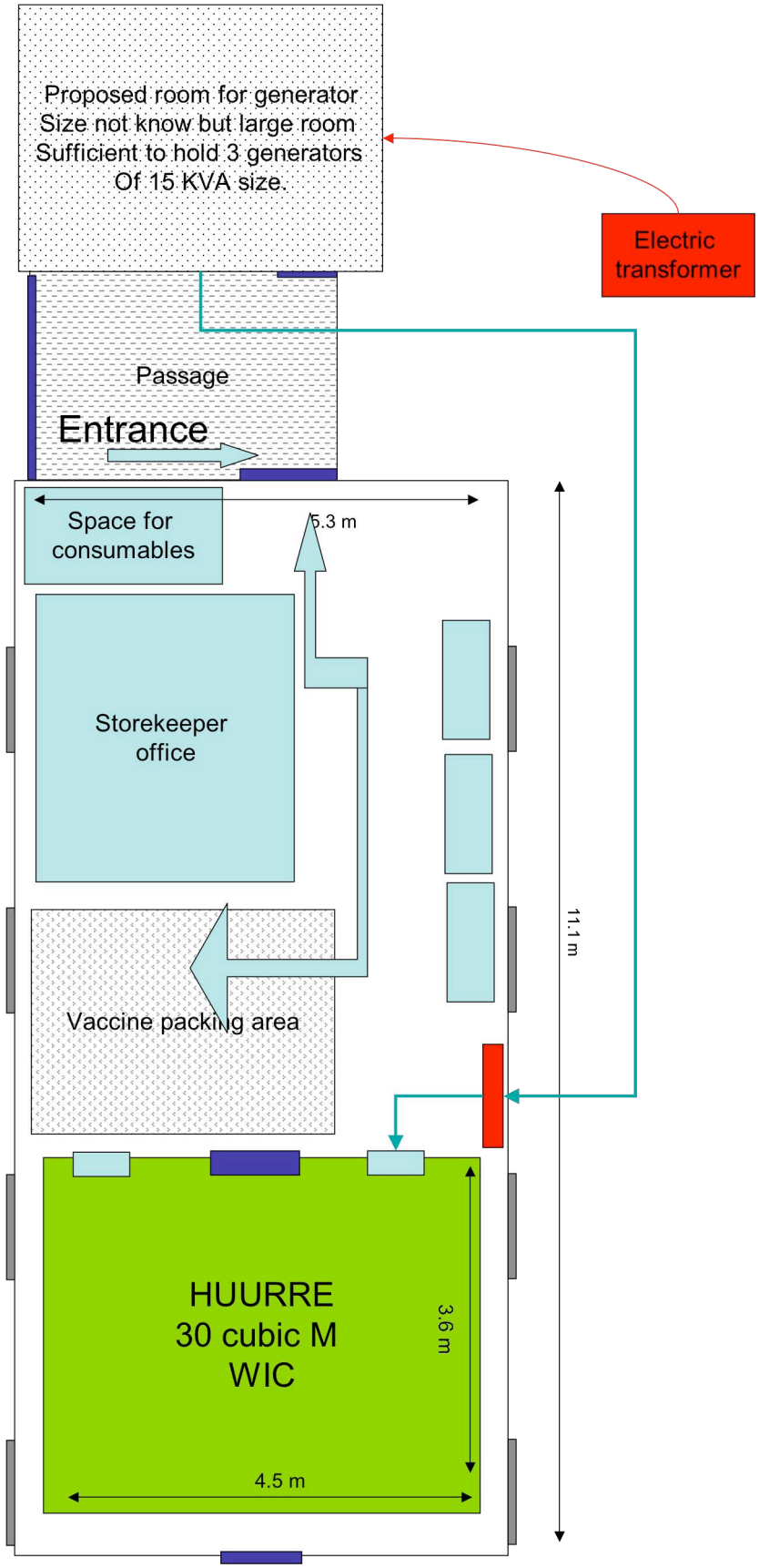


Figure 22: Proposed layout for Bolangir vaccine store and placement of 30 m^3 WIC

5.8. JABALPUR, MADHYA PRADESH

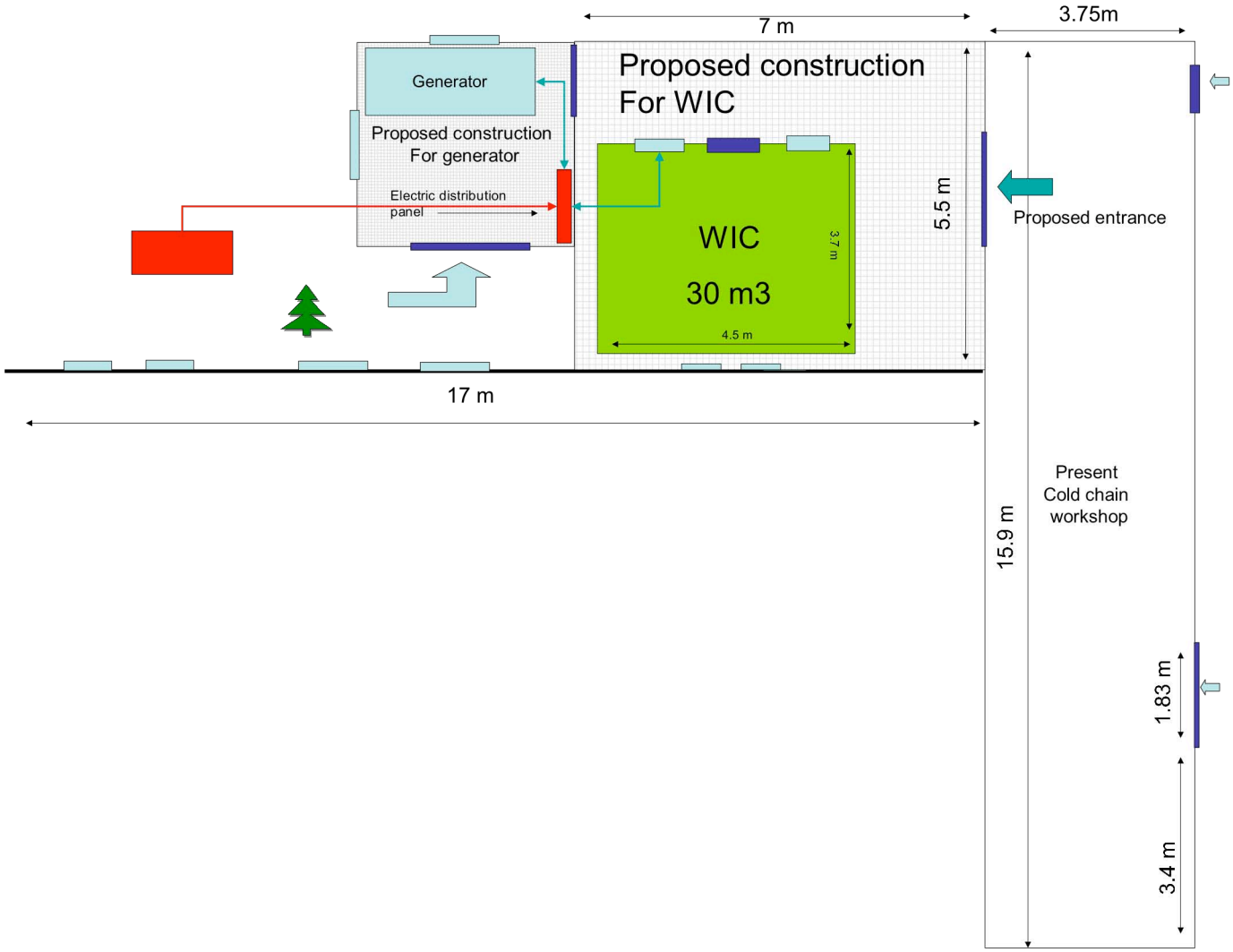


Figure 23: proposed construction of room and placement of WIC

5.9. ALLAHABAD, UTTAR PRADESH

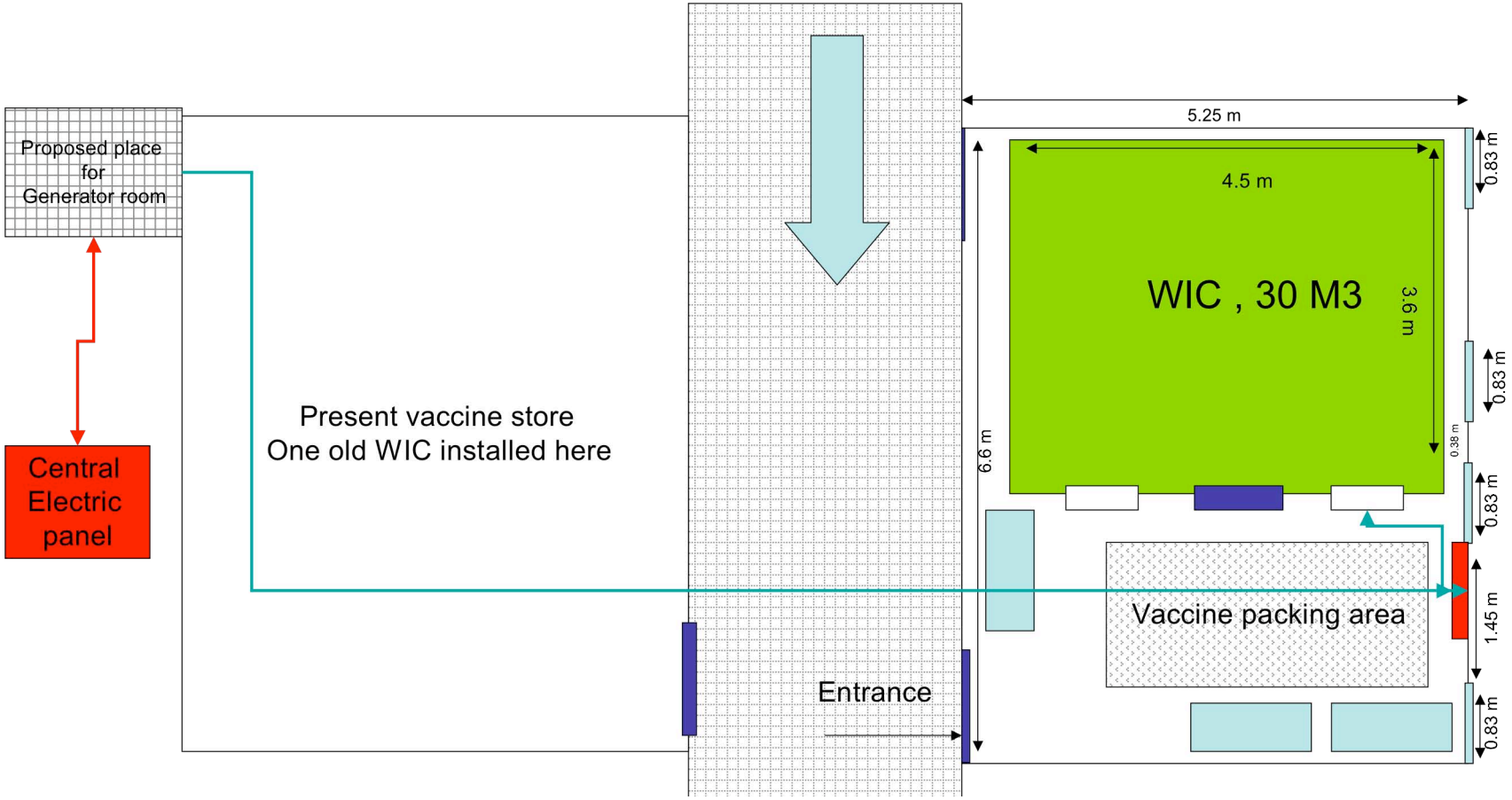


Figure 24: Layout of proposed site for WIC, Allahabad

5.10. BIKANER, RAJASTHAN

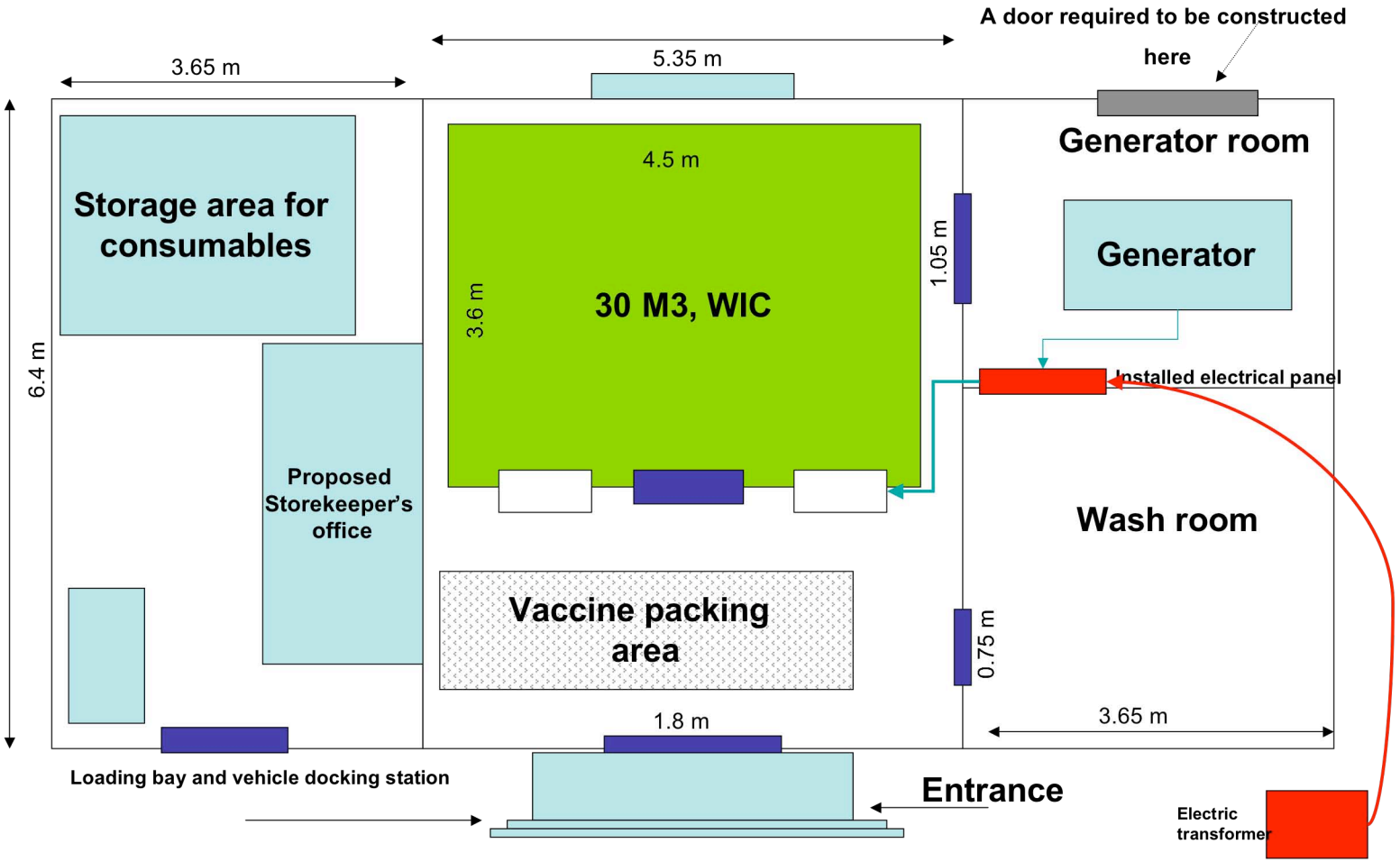


Figure 25: Proposed layout for vaccine store, Bikaner with suggested location for WIC

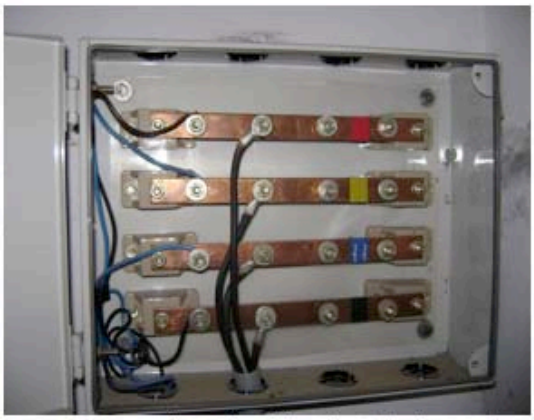
6. PHOTOGRAPHS FROM SITE

6.1. MEERUT, UTTAR PRADESH

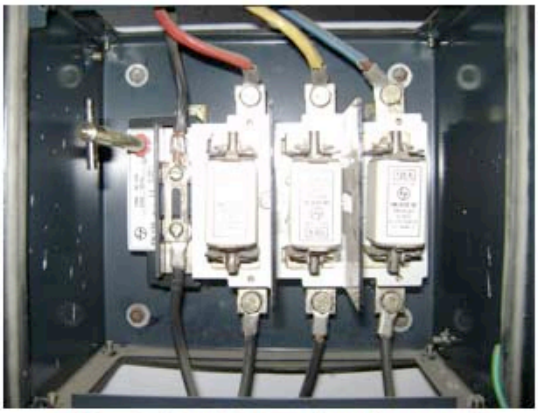
Platform created for mounting WIC, location "A"

Extractor fan installed, location "A"

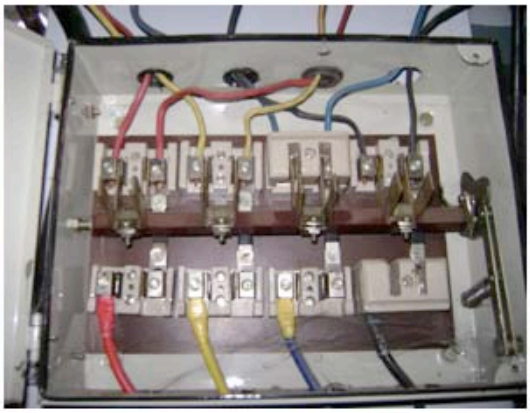
Electrical panel installed, location "A"



Connections inside electrical panel



Circuit breakers, electric panel location "A"



Fuse box, electric panel location "A"

Genset & grid change over switch

Main electric junction box from grid to building

Poor quality of electrical installation

Installed generator

View of location "C" from corner of room

View of location "C" from door

6.2. MUMBAI, MAHARASHTRA

Main entrance of store

Present store keeper office and proposed location for WIC in background

Proposed location for WIF, over stacked By consumables

WIF, generator and poor drainage

Main power distribution box of building

Poor electrical connection to WIF

Metal WIC of scrap value stocked at store, can be removed when required

Entrance to installed WIC. Path to this WIC will get constrained after installation of new WIC

Underground drainage system

Main fuse board with meter

Wash sink in the corner of hall

Proposed location for generator

6.3. PUNE, MAHARASHTRA

Passage to current vaccine store

Proposed room for WIF, Wall on left should be demolished to make space

Inside view of room proposed, from door

Inside view from corner of room

Proposed site for new generator

Installed generator for existing WIC

New generator covered and stocked

Electric Transformer inside campus

Water sink and washing room

Extractor fan installed in stabilizer room

Main electric board of building

Present storekeeper's office, wall with a door should be demolished for WIF

6.4. BELGAUM, KARNATAKA

Main entrance of the proposed store

AC plant installed at the site

Chiller plant installed at the site

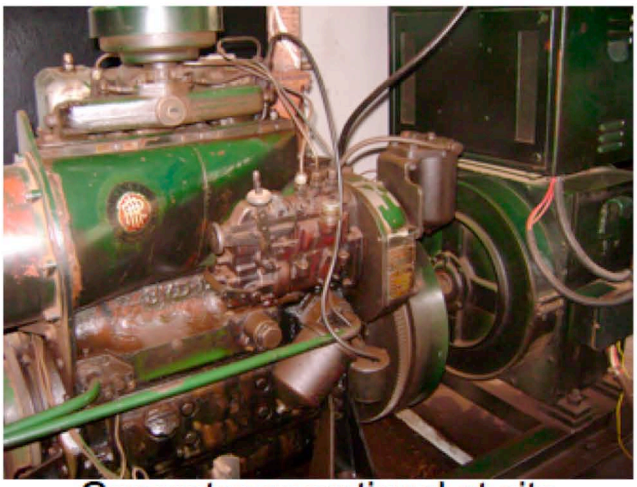
View of main gate from inside

Road access to the site

Space for parking and loading

Electric panel of existing cold rooms

Central electric distribution unit



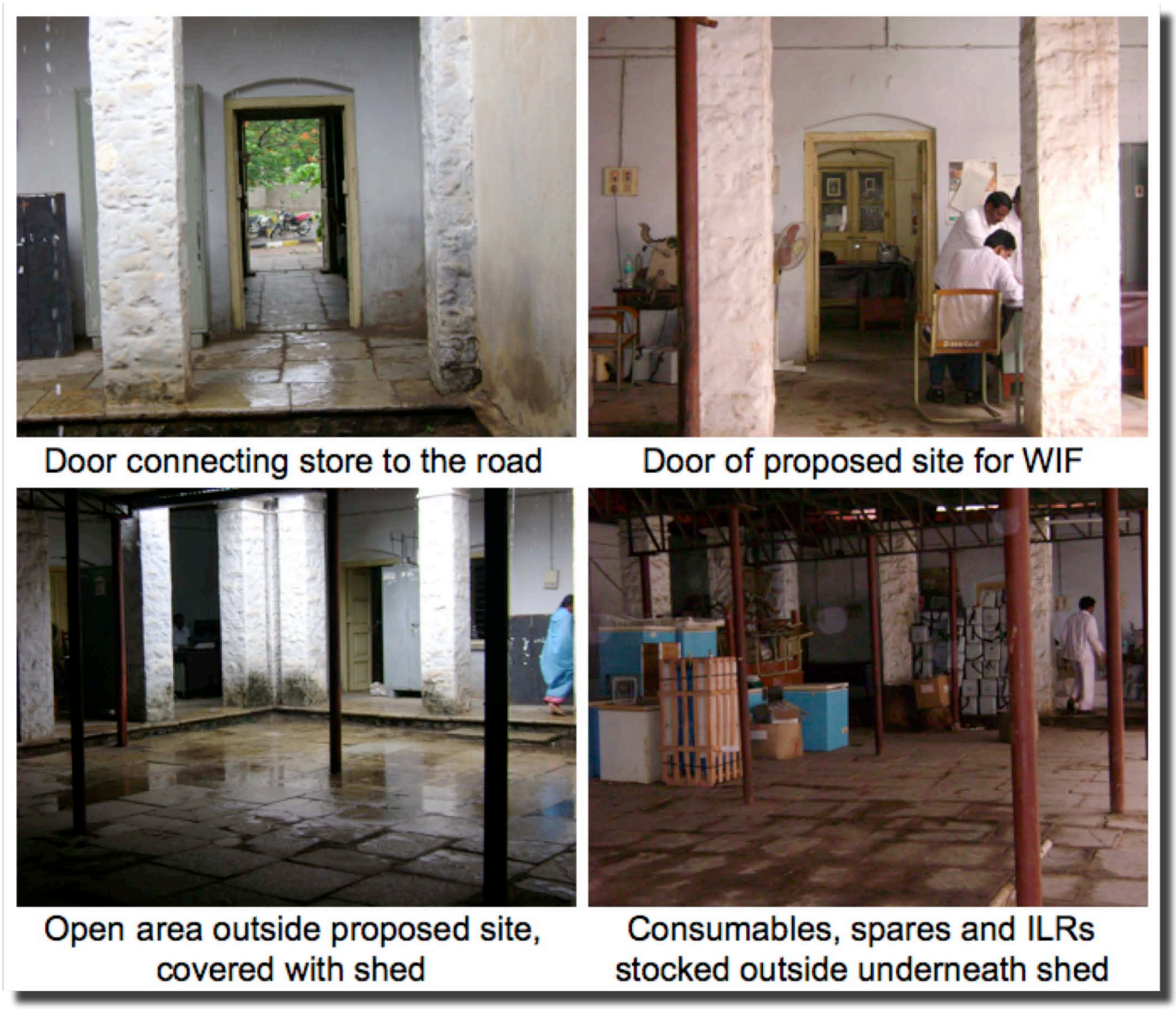
Generator operational at site, providing power backup to WIC/WIF

Corner proposed for new generator

Specifications of installed generator

Old electrical wiring at electric hub

6.5. GULBARGA, KARNATAKA



Door connecting store to the road

Door of proposed site for WIF

Open area outside proposed site, covered with shed

Consumables, spares and ILRs stocked outside underneath shed

Corner proposed for WIF

Drug warehouse in same room

Proposed location for WIF

View of drug warehouse

Generator stocked at the premises

Stabilizer stocked at the premises

Proposed location for generator

Electric pole next to proposed site

6.6. CUDDALORE, TAMIL NADU

Proposed hall for WIC

Corner of proposed WIC location

View from WIC end, main door

Access from road

Over stocked vaccine store

Cold boxes and spare ILR kept in lobby

Proposed site for generator

Main fuse and meter of building

6.7. BOLANGIR, ORISSA

Main door of proposed site

Access to road from proposed site

Entrance to the room. Room is deserted, not in use for long time

Proposed location for WIC

View of proposed room for WIC

View of proposed room for WIC

Room proposed for generator

WIC received, and stocked up

6.8. JABALPUR, MADHYA PRADESH

Site proposed for construction of room to host WIC and generator.

Present refrigeration workshop

Connection to the road

6.9. ALLAHABAD, UTTAR PRADESH

Room proposed for WIC, view from door

OPD ward lobby, proposed room on left

Proposed room, view from rear end

Present WIC room

Space proposed to host generator

6.10. BIKANER, RAJASTHAN

Room prepared for WIC

Inside view of proposed room

Ventilation and lighting provisions

Suggested room for store keeper

Electric panel prepared for WIC

Room proposed for generator

Generator received and stocked up

Door leading to generator room

6.11. KOLKATTA, WEST BENGAL

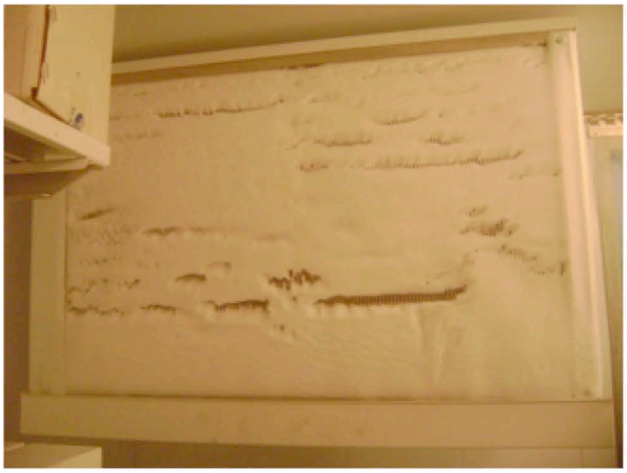
WIF (1) in good shape, cooling units to be replaced

WIF (2) in poor state, refurbishment not recommended

WIF (2), formation of cracks, signs of repair attempts earlier

Almost damaged floor of WIF (2)

WIF (2), water leaking from ceiling



WIF (3), ice formation at evaporator

WIF (3), Alternate use of cooling unit

7. SUMMARY TO BE SENT TO SITES

Following section details the report to be sent to site officers for preparation of site towards installation of cold rooms.

7.1. MEERUT, UTTAR PRADESH

SITE ASSESSMENT REPORT FOR INSTALLATION OF WIC AND WIF IN MEERUT

TO

DR. M K GUPTA

ADDITIONAL DIRECTOR, HEALTH AND FAMILY WELFARE

LALA LAJPAT RAI MEDICAL COLLEGE,

GARH ROAD, MEERUT,

UTTAR PRADESH

SITE ASSESSMENT CARRIED ON 19 JUNE 2007

7.1.1. Background

UNICEF has designated IT Power India to inspect and install the walk-in cold rooms at 11 locations in India, which includes 4 Walk-in Freezers (WIF), 8 Walk-in-Coolers (WIC) and replacement of 4 cooling units of 2 WIFs . With reference to the Special Service Agreement with UNICEF (number: SSA/INDQ/2007/00001015-0) following activities are to be performed by ITPI

1) Assist in identification and need assessment of suitable location at the proposed site selected by state government authorities/UNICEF
2) Installation of WIC/WIF at these proposed site as per guidelines provided in contract subject to:
3) All civil and electrical work at site completed by state government of respective sites.
4) All required material including WIC WIF parts are available on site (to be arranged by state government)

The evaluation parameters were evolved from The Guideline for Establishing or Improving Primary and Intermediate Vaccine Stores [(WHO/V&B 02.34) Version December 2002] and Equipment performance specifications and test procedures: Cold rooms and Freezer Rooms (WHO V&B 02.33).

Mr Ranjit Dhiman, Cold Chain Consultant, IT Power India visited the proposed sites for inspection.

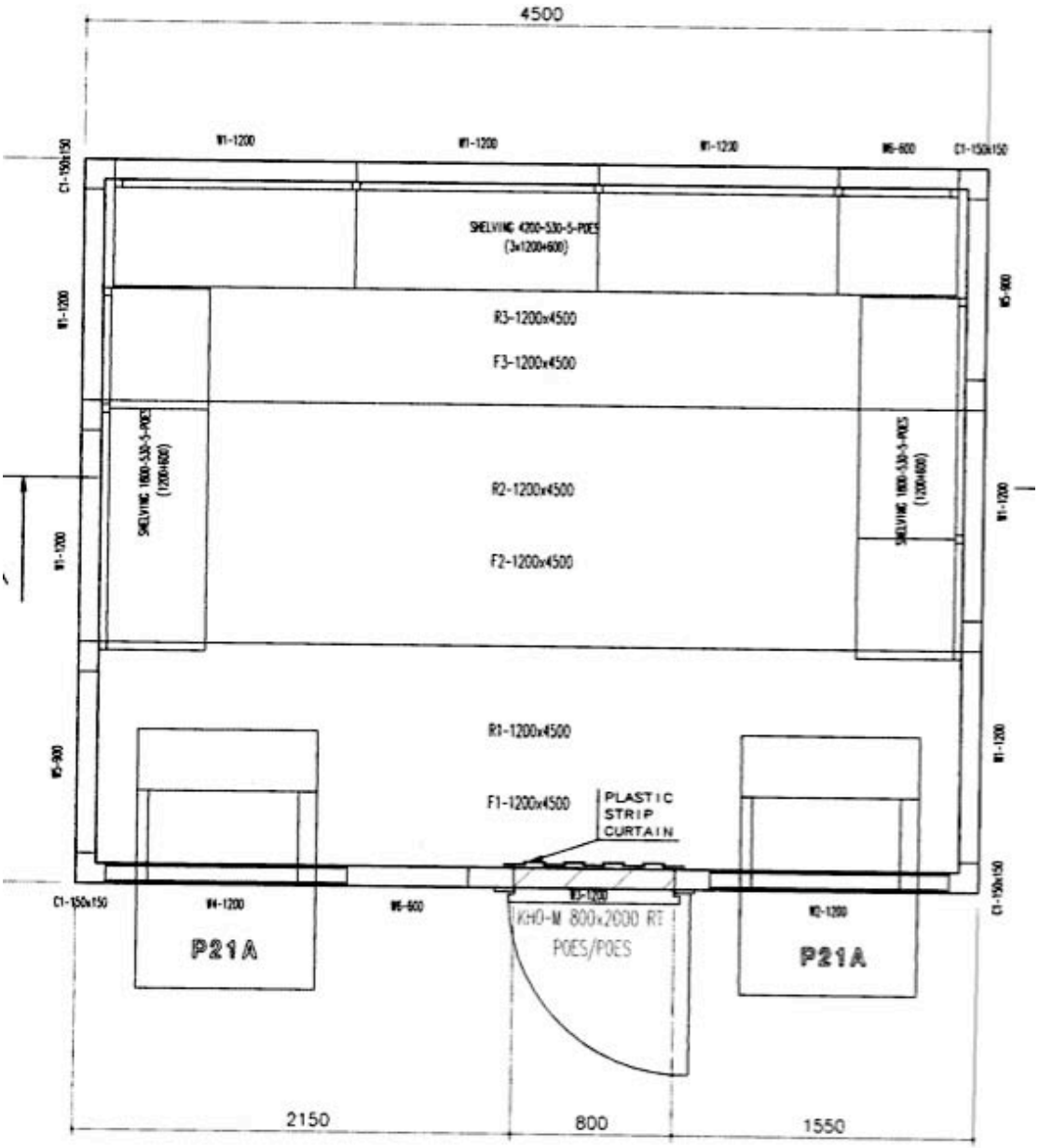
7.1.2. Specifications of cold room(s) to be installed

The site is due for installation of following cold rooms:

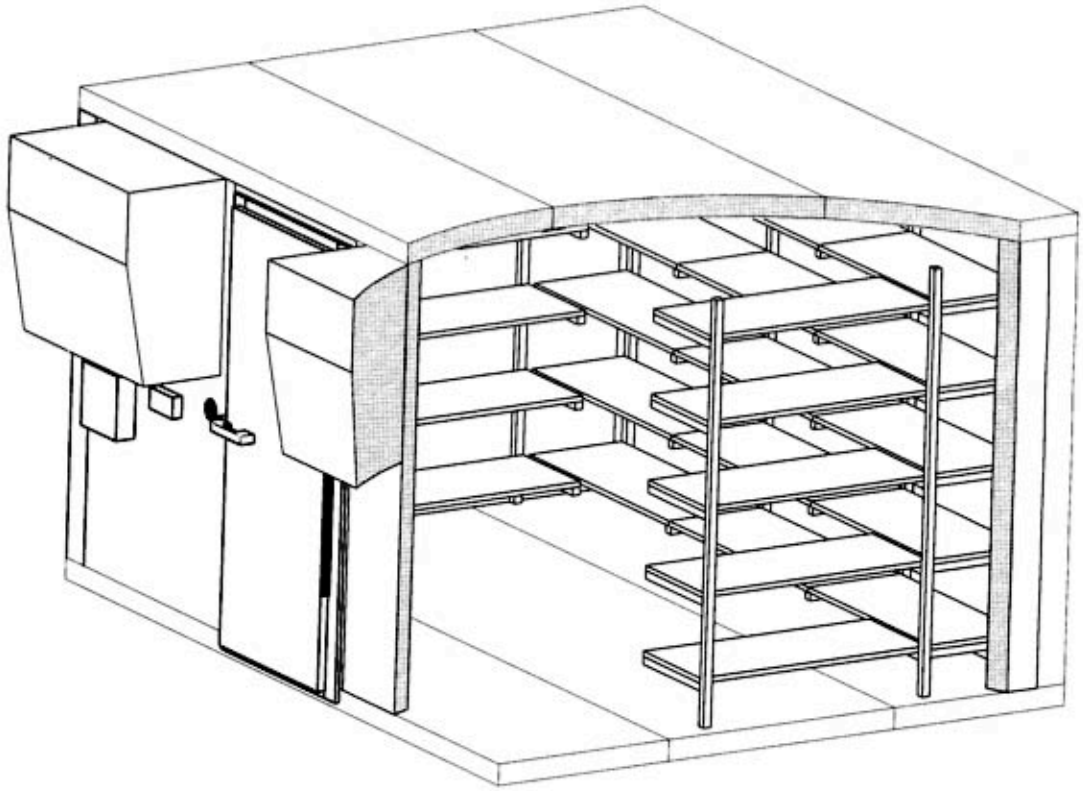
1) WIC of 30 Cubic Meter size, manufactured by HURREE.
2) WIF of 20 Cubic Meter size, manufactured by HURREE.

7.1.3. Drawing of cold rooms

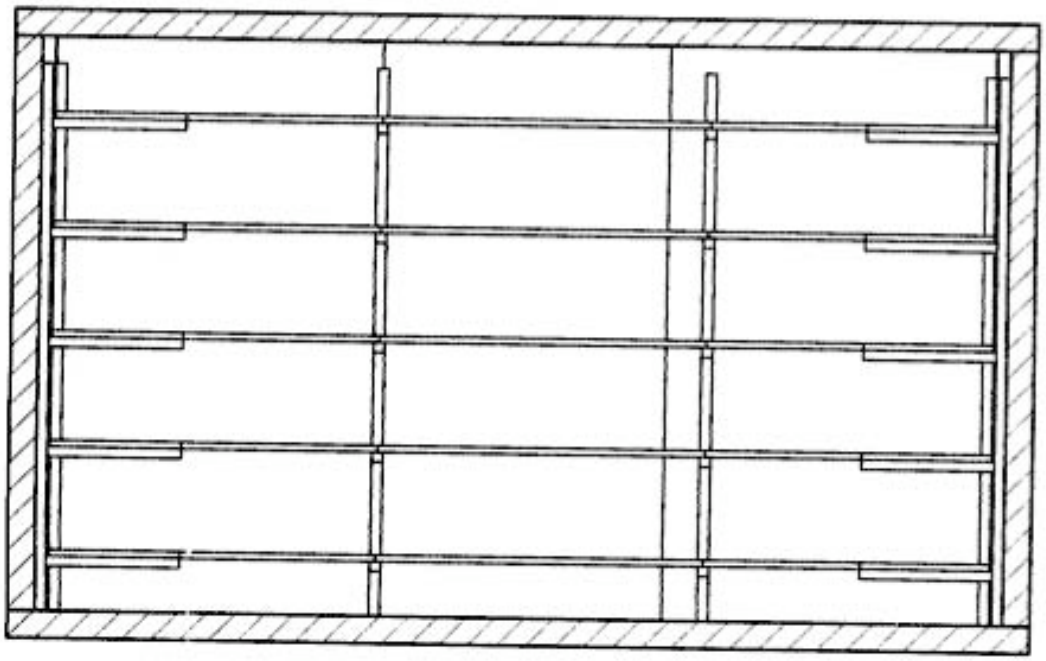
LAYOUT OF 30 M^3, WIC



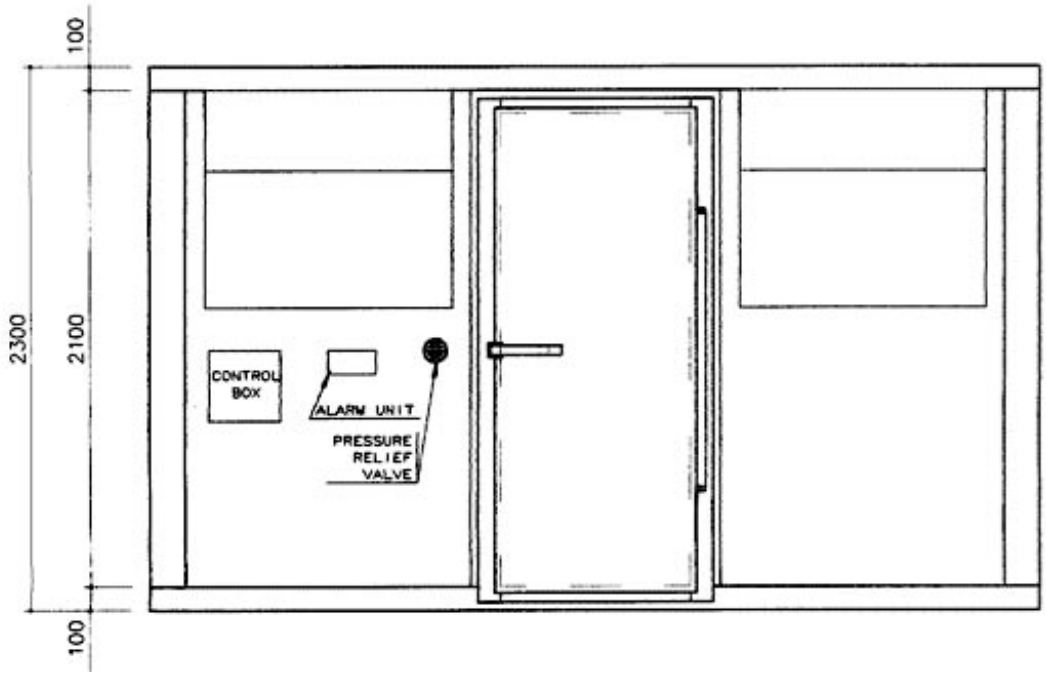
PLACEMENT OF SHELVES IN 30 M^3 WIC



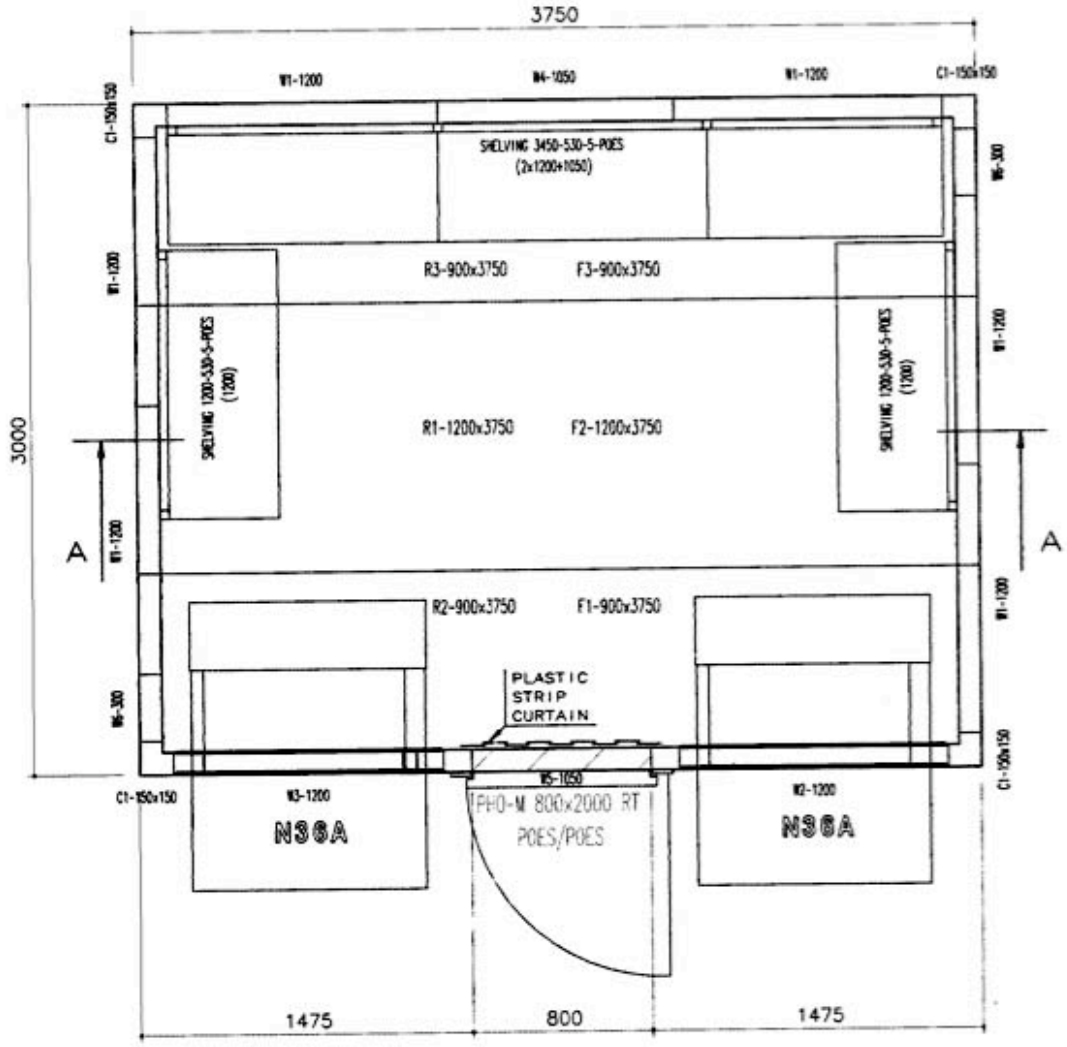
SIDE VIEW OF SHELVES IN 30 M^3 WIC



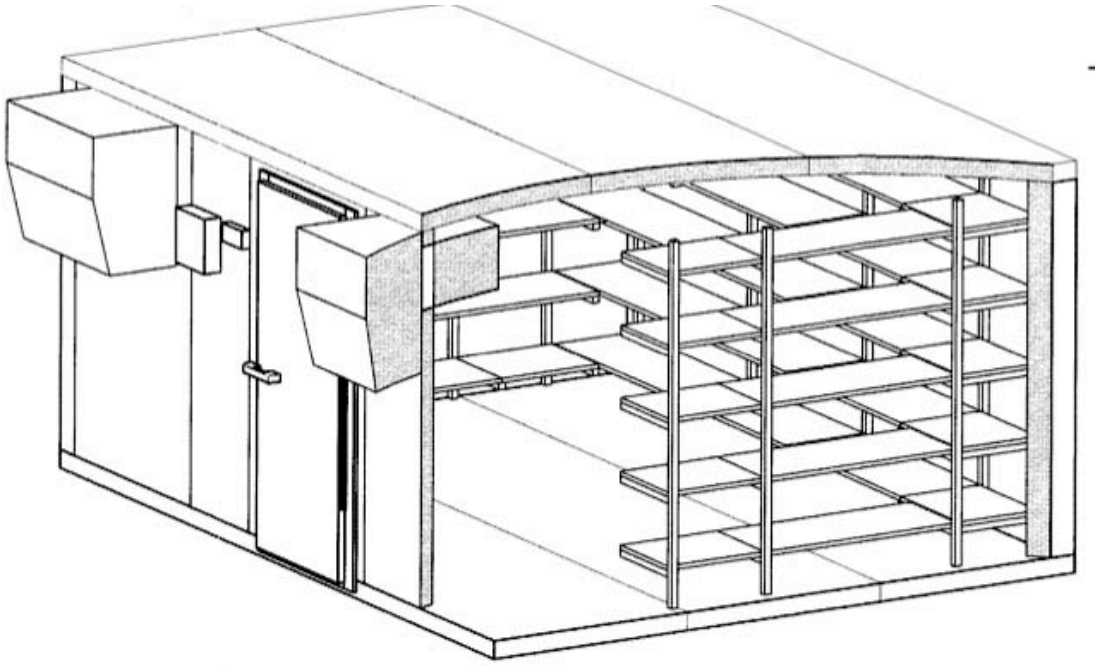
FRONT VIEW OF WIC 30 M^3 SIZE



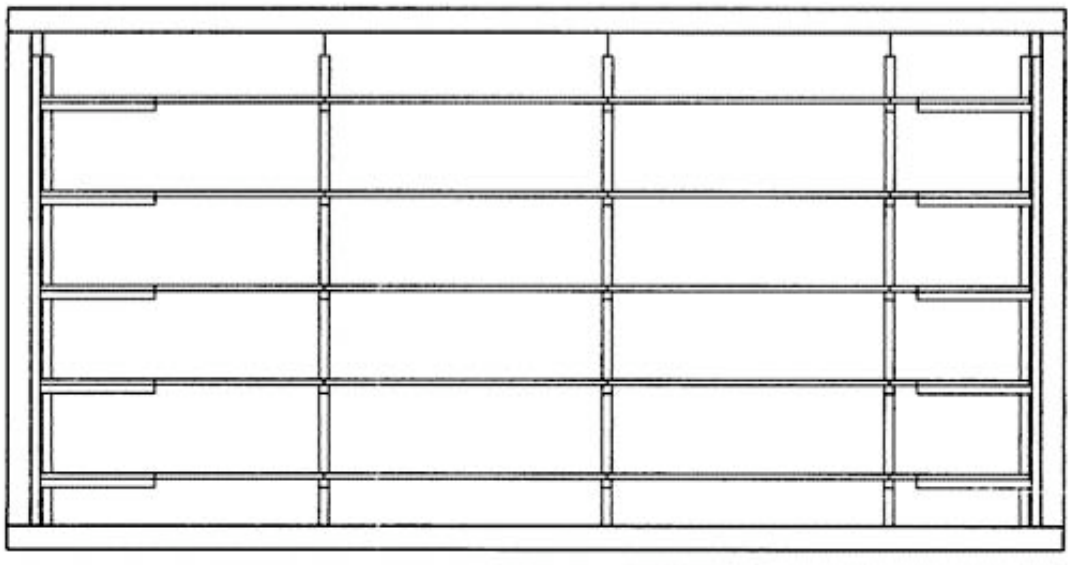
LAYOUT OF 20 M^3 WIF



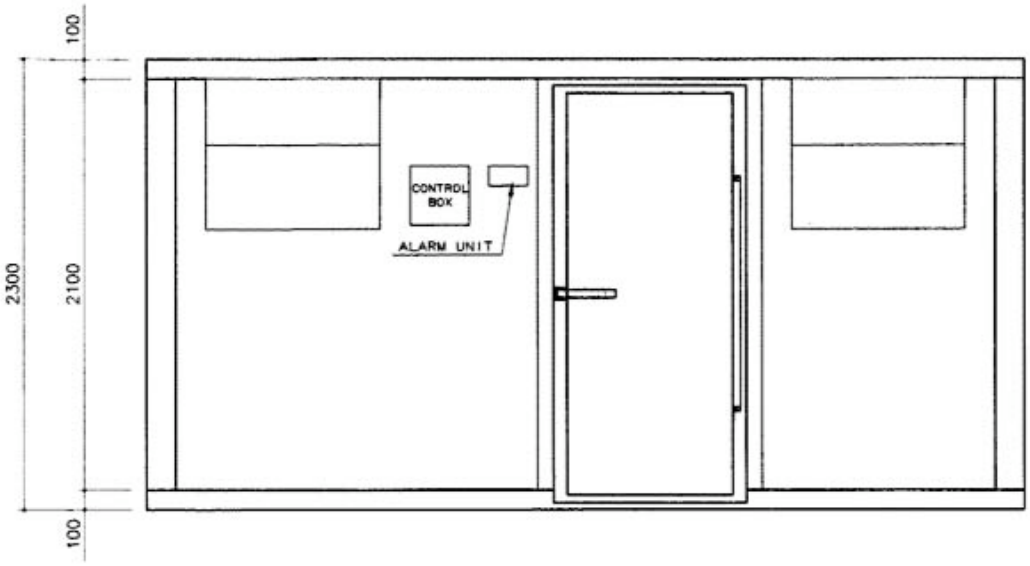
PLACEMENT OF SHELVES IN 20 M^3, WIF



SIDE VIEW OF SHELVES IN 20 M^3 WIF



FRONT VIEW OF WIF, 20 M^3 SIZE



7.1.4. Observations

Office of Additional Director, LLR College, Meerut, was due to receive a new WIF from UNICEF in the year 2006. Due to error in shipment, a WIC has been sent to the store in first quarter of 2006. There has been communication from Ministry of Health, New Delhi acknowledging the error and it was suggested that both WIC and WIF should be installed at the proposed location. Present status is:

1) One new WIC, is stored in the office in packed state since last one year.
2) One new WIF is expected but not received by the store so far. However, the site has received the crates containing panels of a cold room. The cooling units have not arrived yet.
3) Additional director has suggested that the civil work done so far was towards installation of WIF. They are required to initiate a process of fund request for installation of WIC.
4) During the assessment in May 2006, two sites were proposed “Location A” and “Location B”. Refer to assessment report attached as Annexure 8. Additional director now suggests that the “Location B” is no more preferred. Instead another room is proposed which is opposite to “Location A”. Refer to diagram in Figure 12 showing “Location A” and now proposed “Location C”. Location “C” is of smaller size and there is less than adequate room for packing of vaccine.

Based on the site assessment done by IT power India in May 2006, Additional Director has carried out civil at the earlier proposed location for WIF. However, the recommendations are not fully addressed. The civil work carried out so far are:

1) A platform (plinth) has been raised, 4 inches from ground floor at recommended location.
2) A Power distribution box has been installed in the room.
3) Manual changeover switch, between grid power and Genset has been installed.
4) Two air extractor fans have been installed.
5) A new generator of 40 KVA has been installed but currently is not operational as there is no fuel. As per recommendation in earlier report 50 KVA generator was suggested.
6) Water sink has been installed in the room

The above civil and electrical work has not done to the standards. Following are the list of work that needs improvement:

1) Electric connection from central power hub to the manual changeover switch is poorly done
2) There is no shade or cover provided for generator and it is exposed to direct sunlight, rain, storm and thunder.

The other recommendations, which are not carried out so far, are:

1) Install benches for icepack conditioning and packaging.
2) Mount two 1.5 tonne air conditioners in the WIF, ice conditioning and packing zone.
3) Install two telecommunication lines and telephone sets
4) Storekeeper's office and include a secure location to keep records, a heat pump and an air conditioning unit in the office.
5) Install two telecommunication lines and telephone sets.
6) Provide shelves in the storage room adjacent to the WIF.
7) Furnish the storekeeper's office and include a secure location to keep records and an air conditioning unit in the office.
8) Minimise risk of fire by:
    - Improvement of electrical cabling and fault-detection devices (contact breakers)
    - Provision of appropriate fire extinguishers at locations adjacent to all generators and cold rooms (CO_2 or powder extinguishers)
9) Install smoke detectors and sprinklers in the vaccine storage areas.
10) Build a hanger along the front of the building housing the WIF. The hanger should not impair the passage of hot air from the ventilation apertures.

11) Install two water-resistant electrical sockets on the wall under the hanger.

12) Repaint and tile the walls of Location “A” and location “C” where the WIF and proposed WIC is to be installed

The two-storey building is newly constructed. Dr. S K Jain, AAD, proposed two rooms to host WIF and WIF. WIC has been delivered to the site and is awaiting installation. WIF has not been delivered yet. One room is located on the ground floor (location “A”) and the other room (location “C”) is on the same floor opposite to location “A”. The location “A” is available to host the new WIC.

A general layout of the Meerut cold store facility is provided in Figure 12.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The dimensions of location “A” are: 9 m by 7.8 m with height of 3.56 m. The size of the cold room to be installed is 30 M3 (4.5m x 3m x 2.1m).
2) The dimensions of location “C” are: 6.25 m by 5.5 m with height of 3.56 m. The size of the freezer room to be installed is 20 M3 (3.75m x 3m x 2.1m).
3) Both location “A” and “C” are well ventilated: location “A” has 14 windows, each 1.69 X 1.3 m in size and location “C” has 6 windows of each 1.69 X 1.3 m in size. There are two entry doors at both locations, wide enough for the cold boxes to be easily carried in and out.
4) Both the rooms have shelves and two lockable cabinets.
5) There is sufficient room at location “A” (as per WHO norms and EVSM criteria) for vaccine packaging, a desk and chair for the storekeeper and for storage of cold boxes, diluents, syringes and droppers.
6) There is a provision of three-phase power supply to both the rooms.

7.1.5. Site status

- ❑ Water supply and sanitary facilities

There is water supply at the proposed location. A sink is available for washing/cleaning with a provision to evacuate water into an underground drain. However, there is no provision of draining water from the floor in the hall.

- ❑ Drainage

The building is poorly drained, considering hat this is a modern construction. The building has underground drainage facility outside the proposed location, which is not connected, however there is no drainage system inside the proposed rooms.

Constructing a raised plinth on which the WIF (location “C”) can be mounted will prevent eventual corrosion and provide a safeguard against possible flooding. Plinth would require assessment of floor loading capacity.

- Lighting

The proposed location has adequate lighting with large windows. There is no exposure to direct sunlight at the packing area.

- Ventilation, heating and cooling

Locations proposed for the WIF and WIC has a ceiling height of 3.56 m. Both the rooms are well ventilated with several windows in each room. Two extractor fans have already been installed in a room constructed inside the hall of location “A”.

Extractor fans are required in on one side of the building at location “C”, from where the cold room chiller air is evacuated.

Location does not require any heating.

- Communications

The storekeeper’s office (placed in proposed location ”A” does not have a telephone nor data telecommunication line (internet). The telephone and telecommunications lines should be made available and kept separate so that the storekeeper’s office line can eventually handle data transfer and the cold room lines can be linked to the temperature alarms and used for computerised monitoring .

- Security

The cold store facility is housed in a secured compound with guard services. The space allocated is lockable. Security threat with respect to theft or vandalism is considered very low. Security risks with respect to fire are high and there are no fire extinguishers installed in the hall.

- Vehicle access and loading convenience

Vehicles cannot directly access proposed Location. Currently, for the already operating store, packed vaccines are transported by hand to the road adjacent to the store from where they are loaded onto the vehicles. The passageway where vehicle can reach and vaccine is loaded is broad and adequate for vaccine loading.

- Security during loading

The site is adequately secured for loading and unloading of vaccine from vaccine van. Building is secured with concrete fence.

- Weather protection during loading

At present, there is no protection at the loading point This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of building or loading point.

- Loading dock

There is no loading dock, and there is no scope to build one.

- Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and at the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

The proposed size of the storekeeper's office is 3 m X 2.5 m and it has access to proposed WIC/WIF locations (Location "A" and "C"). Sufficient natural light enters the room. The furniture in the office should be arranged as shown in Figure 1, which requires a minimum area of 7.5 m^2. Records can be maintained and kept in this office.

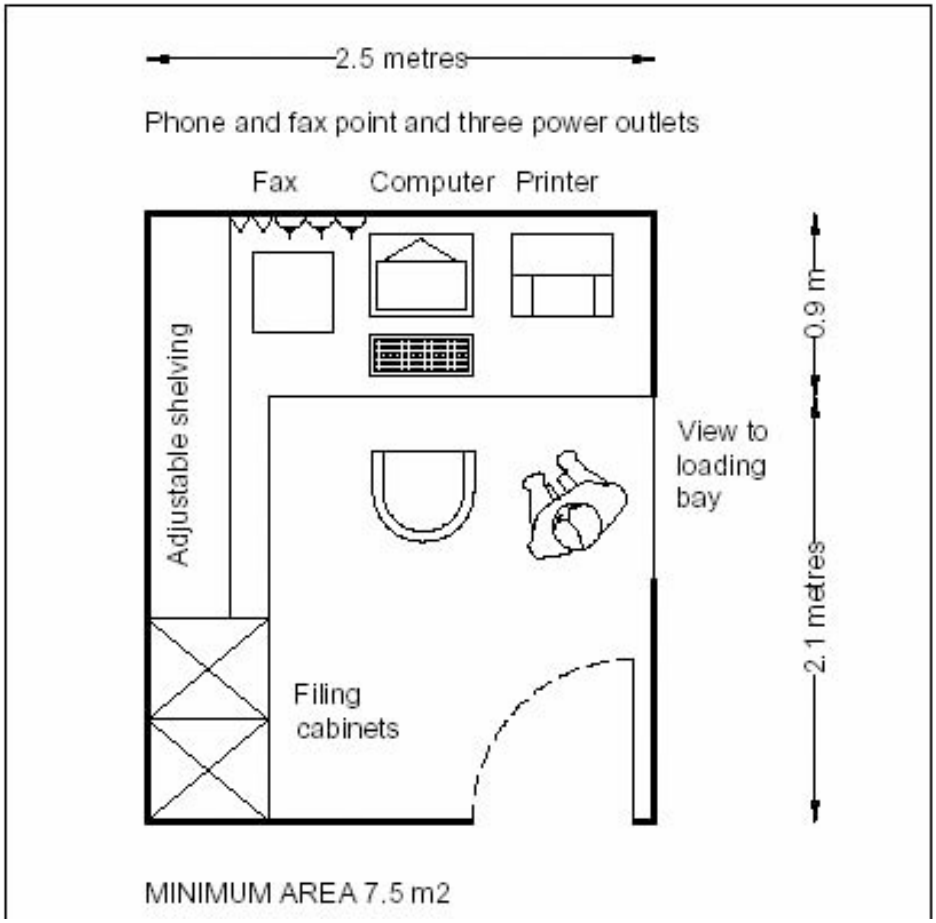


Figure 1: Proposed layout for storekeeper's office

- Packing area

With reference to Figure 2 an ”L” shaped zone is available to the front and side of the WIC (Location “A”). This space is adequate for icepack conditioning and packing as per WHO-recommended norms. Utilisation of this space will approximate that recommended in the WHO layout.

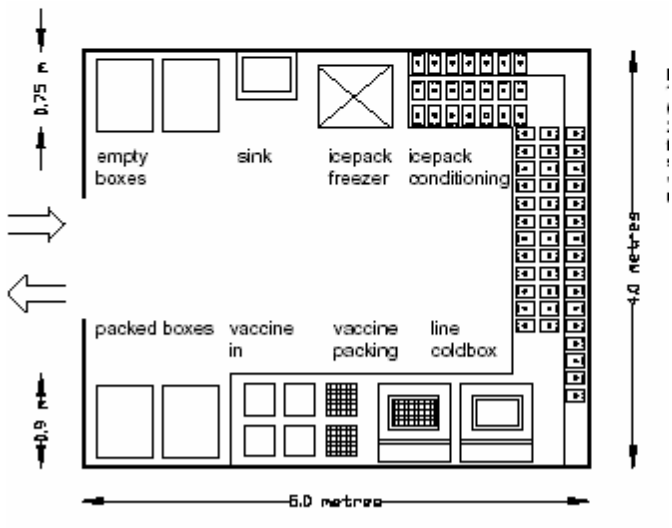


Figure 2: WHO recommended norms for icepack conditioning and packing of vaccine

- Proposed WIF

A space of 3.75 m x 3 m has been assigned at proposed Location “C” for assembling the 20 m^3 WIF. It should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness is proposed to provide a base for the WIF. Positioning of the WIF is indicated in drawing Figure 14.

- Storage of consumables

A space of 3.3 m x 3 m is available immediately adjacent to the WIC (Location “A”) for packing of vaccine. This requires storage shelving and is adequate for storage of diluents and immunisation-related consumables. No other location or facility is available for the storage of supplies except for the large lobby available in the room.

- Backup generator

A backup generator of 40 KVA has been mounted at the open space adjacent to location “A”. However the generator needs to be protected with a shed.

- Flow of personnel

The flow of movement of personnel associated with the management, reception and distribution and storage of vaccines at this store is shown in the Figure 3. The proposed layout is comparable to the model proposed in the WHO reference diagram.

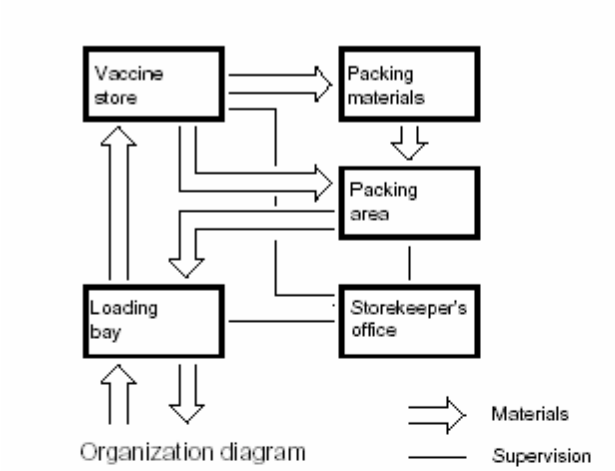


Figure 3: Recommended organisational structure of cold store

- Power situation and stability

The quality of the three-phase power supply from the national grid is reported to be adequate by electrical technician (Mr. Ambawali).

The new generator (40 KVA) has been installed for WIC and WIF.

- Electrical safety

Though the electrical fittings are securely provided with the construction of building, open wiring at distribution panel and fuse bypassing at few ends cause security hazard at the given location. Electricity supply to the proposed cold rooms is sourced from the central power supply board of building. .

- Circuits with correct rating

Electrical circuits for proposed cold rooms are fitted with isolators through switchover devices. Each WIF and WIC is wired internally to the central board of the building

7.1.6. Recommendations linked to installation of cold room

1) Install WIC at location “A” as the space available is adequate as per WHO guidelines.
2) Install WIF at location “C”. The space available is less than adequate, but considering that location “A” will be furbished as per recommendation, this location would not be used for packing of vaccine and ice pack conditioning, therefore WIF can be installed here.
3) A new three-phase 50 A electrical line should be drawn from the LT transformer adjacent to the Meerut store. This transformer provides

power to the building. This line should be drawn directly to a metering and distribution panel mounted near the generator set.

4) New three-phase distribution lines should be drawn from this distribution panel to each WIF and WIC. The panel should also be connected through an auto-start to the generator.
5) Rewire electrical supply, distribution panels and circuit protection arrangement for the entire cold room installations, with appropriate connection to the auto-start generator set.
6) Pour a reinforced concrete slab in the form of a raised plinth of 6 to 10 cm thickness at the location where the new WIF is to be located (Location "C"). This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing. It is to be noted, however, that the floors seem to be washed rarely.
7) Repaint and tile the walls of location "A" and location "C" where the WIF and proposed WIC is to be installed
8) Complete the required electrical work, including a three-phase dedicated power supply with a manual power cut-off switch for the cold room. (Location "C")
9) Improve the present wiring from central power distribution panel to proposal location "A" manual changeover box.

7.1.7. Recommendations as per guidelines, not linked to installation of cold room

1) Install two telecommunication lines and telephone sets. (Location "A")
2) Provide shelves in the storage room adjacent to the WIC/WIF. (Locations "A" and "C")
3) Furnish the storekeeper's office and include a secure location to keep records, a heat pump and an air conditioning unit in the office. (Location "A")
4) Minimise risk of fire by:

- Removal of unused inflammable materials from the premises. (Locations "A" and "C")
- Improvement of electrical cabling and fault-detection devices (contact breakers) (locations "A" and "C")
- Provision of appropriate fire extinguishers at locations adjacent to all generators and cold rooms (CO_2 or powder extinguishers) (locations "A" and "C")

5) Install smoke detectors and sprinklers in the vaccine storage areas. (Locations "A" and "C")
6) Build a hanger along the front of the building housing the WIF. The hanger should not impair the passage of hot air from the ventilation apertures.

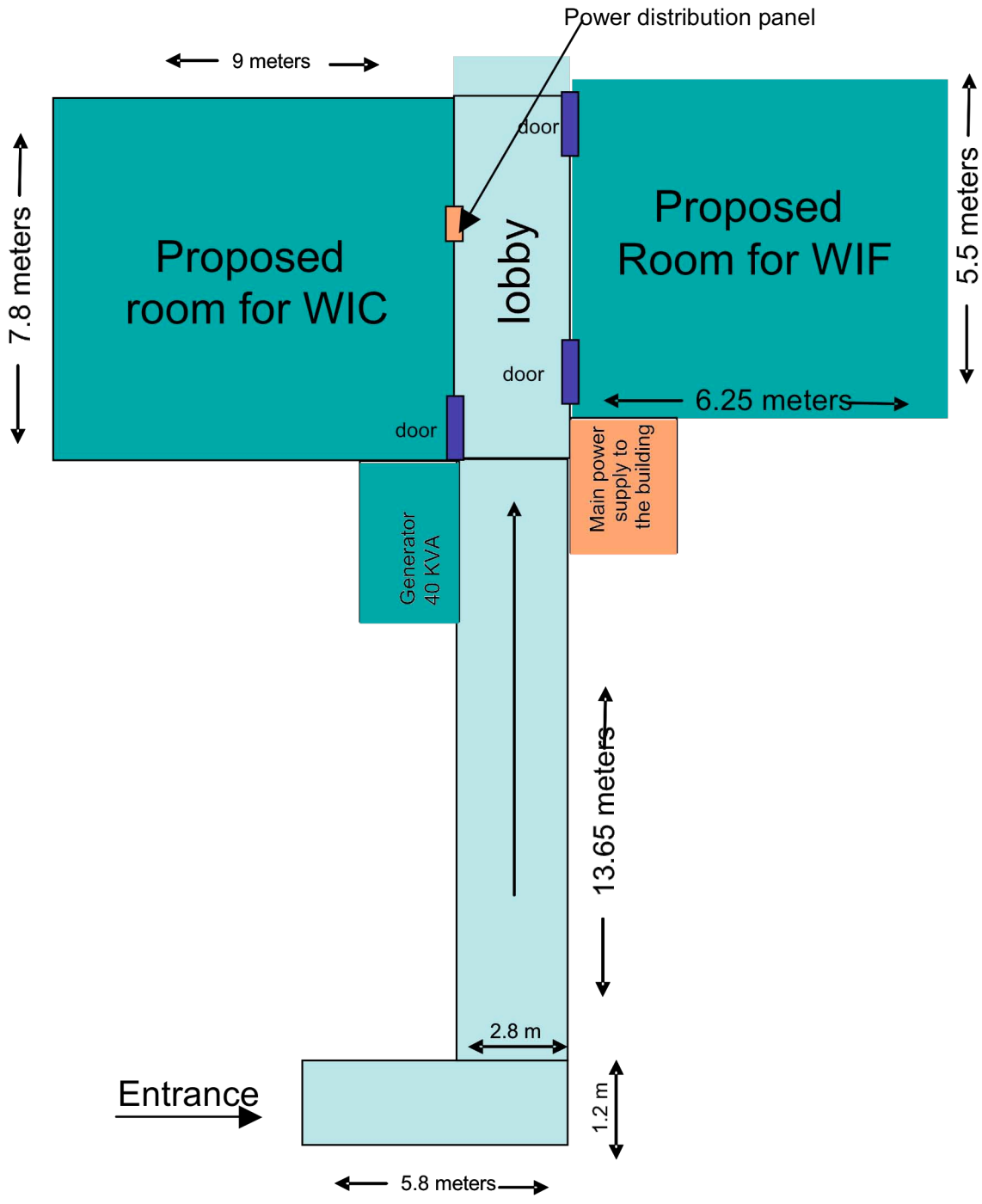
7) Install two water-resistant electrical sockets on the wall under the hanger.
8) Install a washing/cleansing water supply system and associated drainage points at the location where the new WIF is to be installed. (Location “C”).
9) Install benches for icepack conditioning and packaging. (Location “A”)
10) Mount two 1.5 tonne air conditioners in icepack conditioning and packing zone of Location “A”.
11) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIF and WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

7.1.8. Conclusion

The location “A” is almost ready for installation of WIC, subject to completion of electrical work. Location “A” is best suitable for installation of WIC, and location “C” is suitable for installation of WIF. However, officials on site suggest that provision for WIF has been made at location “A” and they are required to initiate official communication for installation of WIC. It is essential that the administrative procedures are complete before proceeding with installation. Location “C” is not ready for installation of WIF and requires substantial civil and electrical work. In addition, the WIF has not been delivered yet which renders the installation phase impossible within the contractual the contractual timeframe.

7.1.9. Site Drawing

FIGURE 12. LAYOUT OF MEERUT COLD STORE FACILITY (GROUND FLOOR) AND SUGGESTED



LOCATIONS FOR THE NEW WIF AND WIC

FIG.13 PROPOSED LOCATION (A) FOR INSTALLATION OF WIC

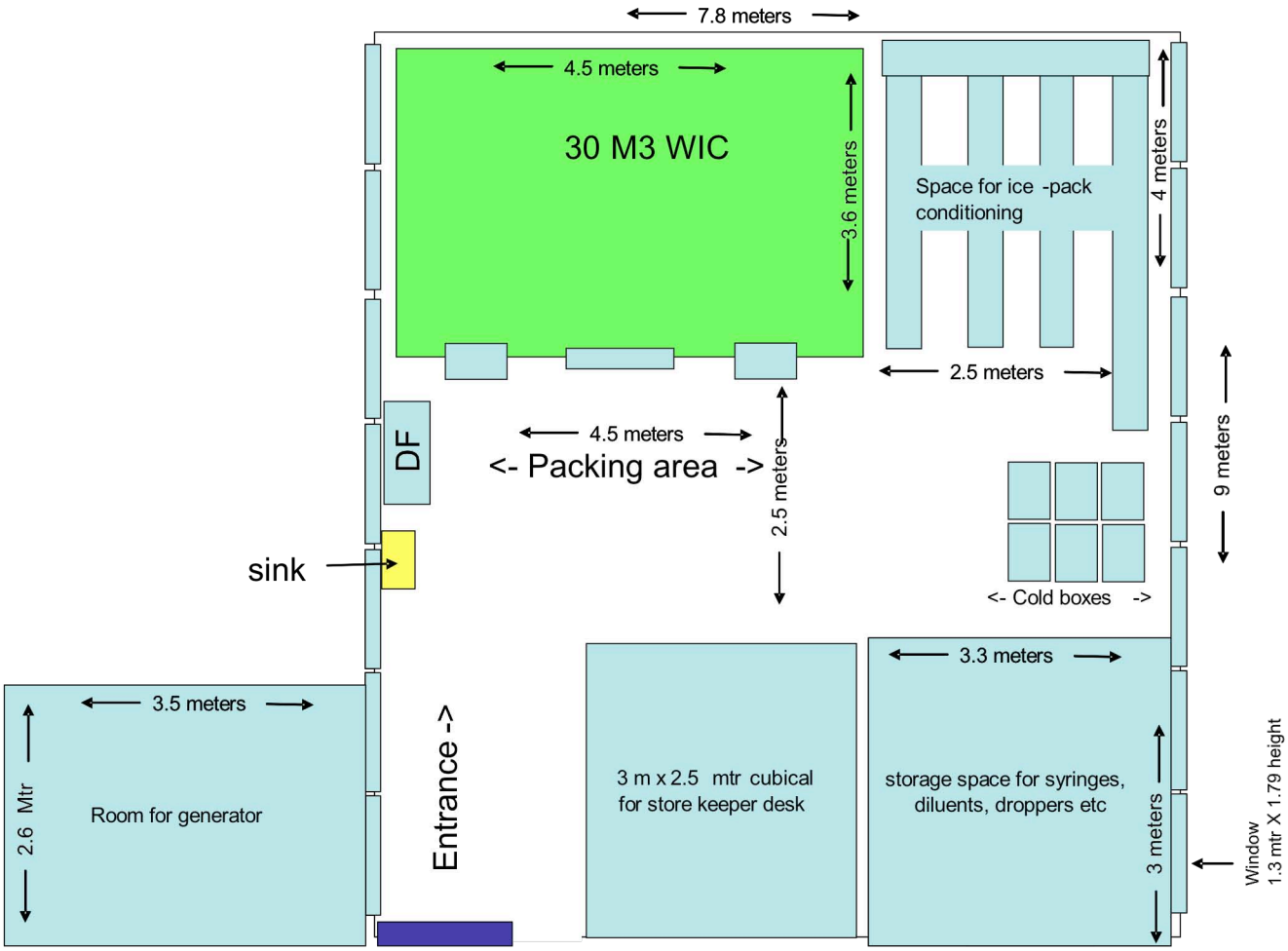
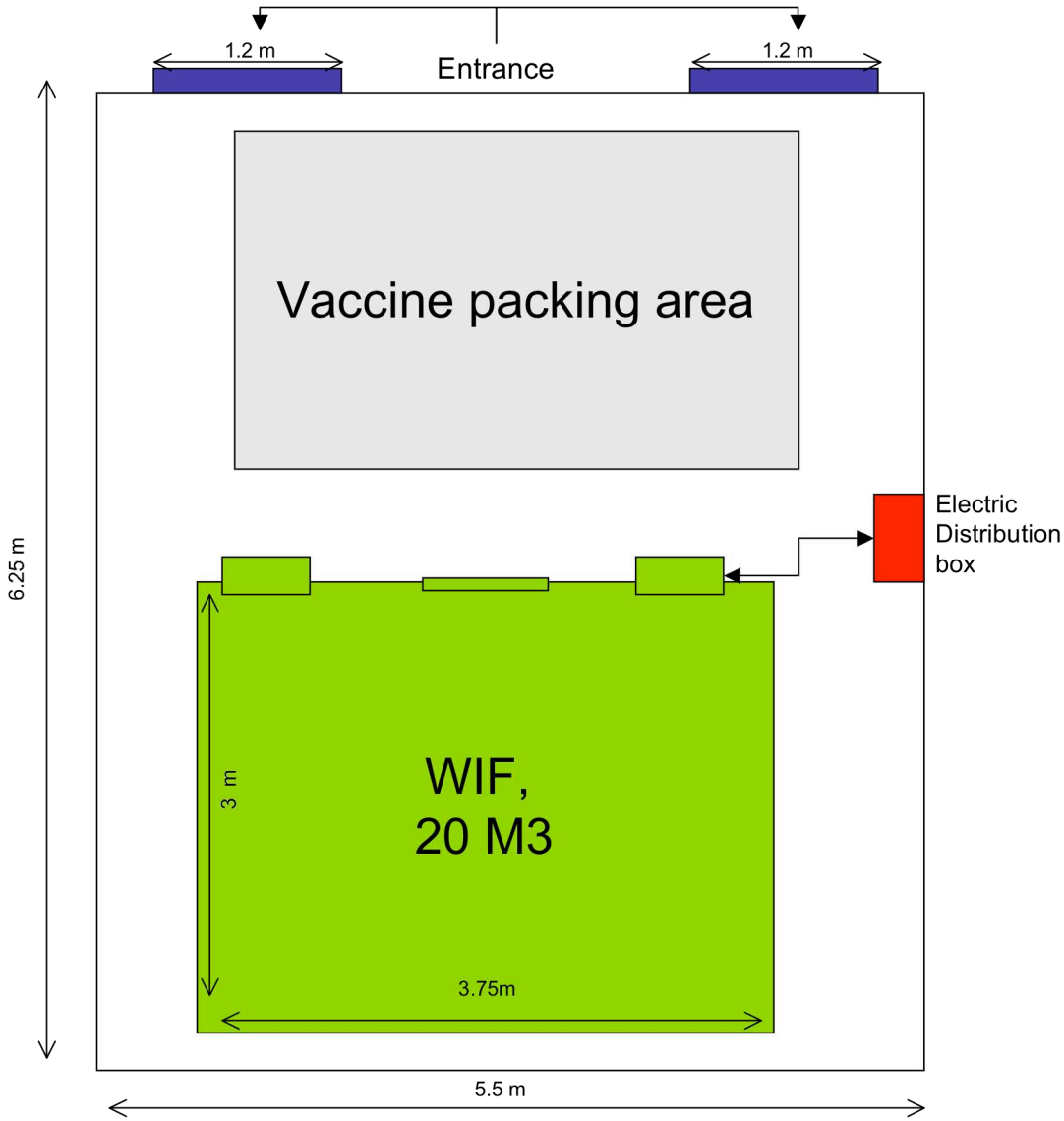


FIG. 14 LAYOUT OF LOCATION "C" TO HOST WIF



7.2. MUMBAI, MAHARASHTRA

SITE ASSESSMENT REPORT FOR INSTALLATION OF WIC AND WIF IN MUMBAI

TO

MR. D S RAO
DEPUTY ASSISTANT DIRECTOR
MR B R PAGARE
DIRECTOR GENERAL

UNICEF SUPPLIES STORE
DADGC STORES,
GOVERNMENT MEDICAL STORES DEPOT,
MUMBAI CENTRAL – 400 008, MAHARASHTRA

SITE ASSESSMENT CARRIED ON 20 JUNE 2007

7.2.1. Background

UNICEF has designated IT Power India to inspect and install the walk-in cold rooms at 11 locations in India, which includes 4 Walk-in Freezers (WIF), 8 Walk-in-Coolers (WIC) and the replacement of 4 cooling units of 2 WIFs . With reference to the Special Service Agreement with UNICEF (number: SSA/INDQ/2007/00001015-0) following activities are to be performed by ITPI

1) Assist in identification and need assessment of suitable location at the proposed site selected by state government authorities/UNICEF
2) Installation of WIC/WIF at these proposed site as per guidelines provided in contract subject to:
3) All civil and electrical work at site completed by state government of respective sites.
4) All required material including WIC WIF parts are available on site (to be arranged by state government)

The evaluation parameters were evolved from The Guideline for Establishing or Improving Primary and Intermediate Vaccine Stores [(WHO/V&B 02.34) Version December 2002] and Equipment performance specifications and test procedures: Cold rooms and Freezer Rooms (WHO V&B 02.33).

Mr Ranjit Dhiman, Cold Chain Consultant, IT Power India visited the proposed sites for inspection.

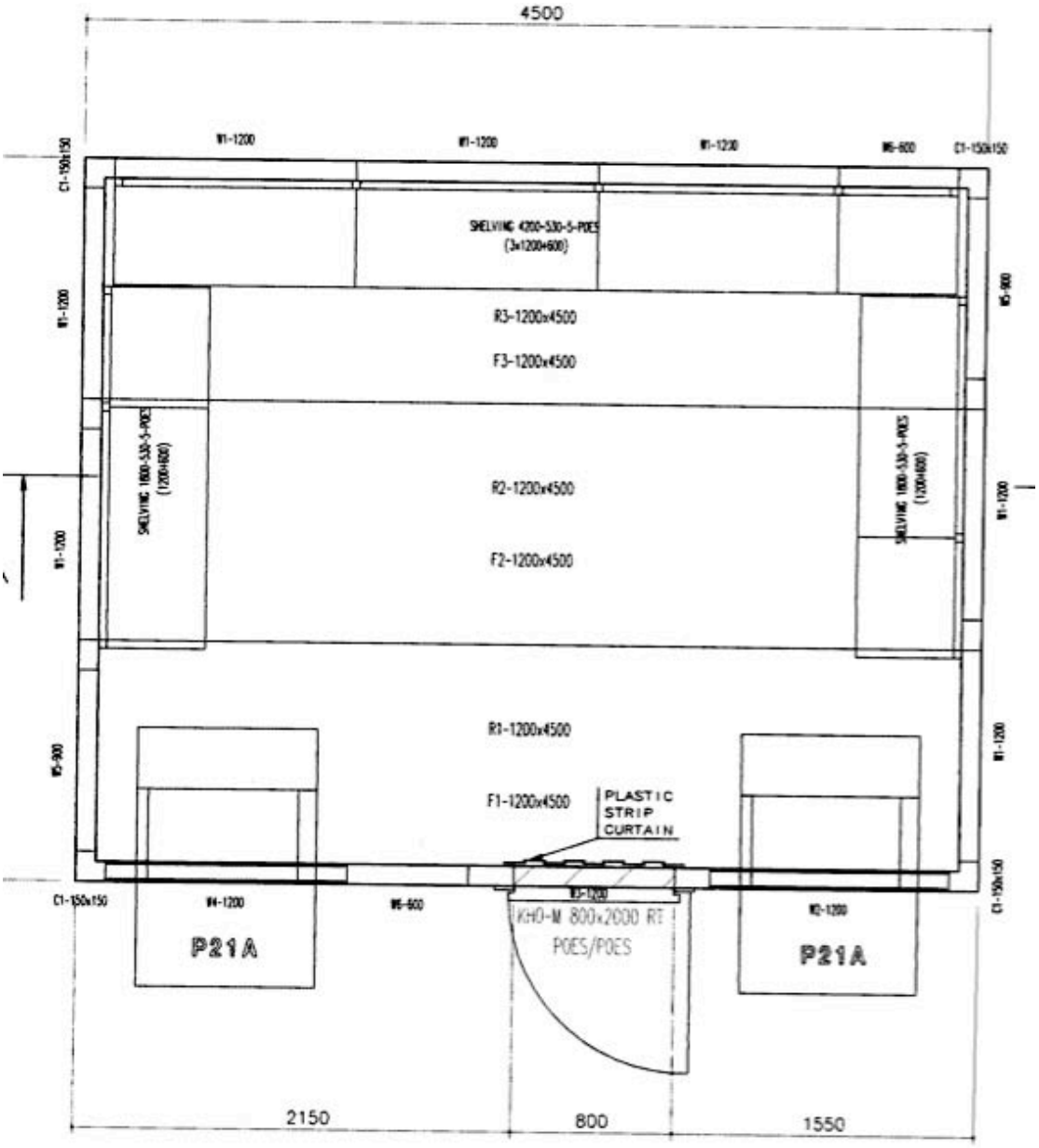
7.2.2. Specifications of cold room(s) to be installed

The site is due for installation of following cold rooms:

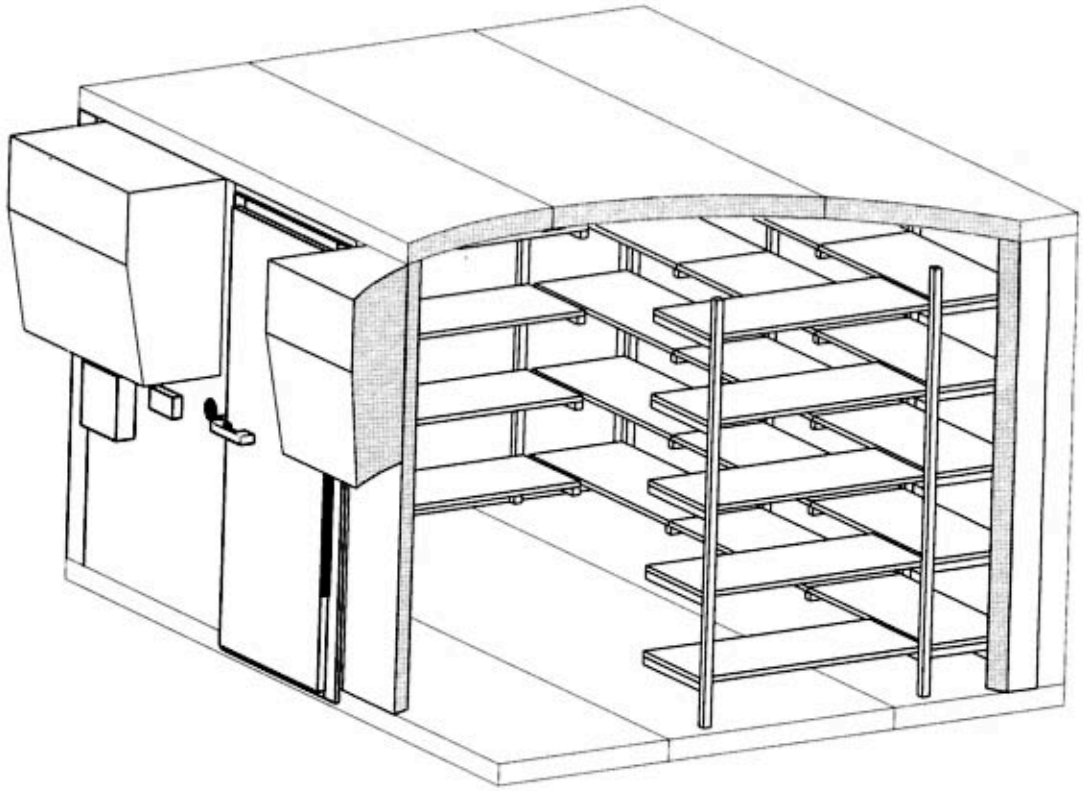
1) WIC of 30 Cubic Meter size, manufactured by HURREE.
2) WIF of 20 Cubic Meter size, manufactured by HURREE.

7.2.3. Drawing of cold rooms

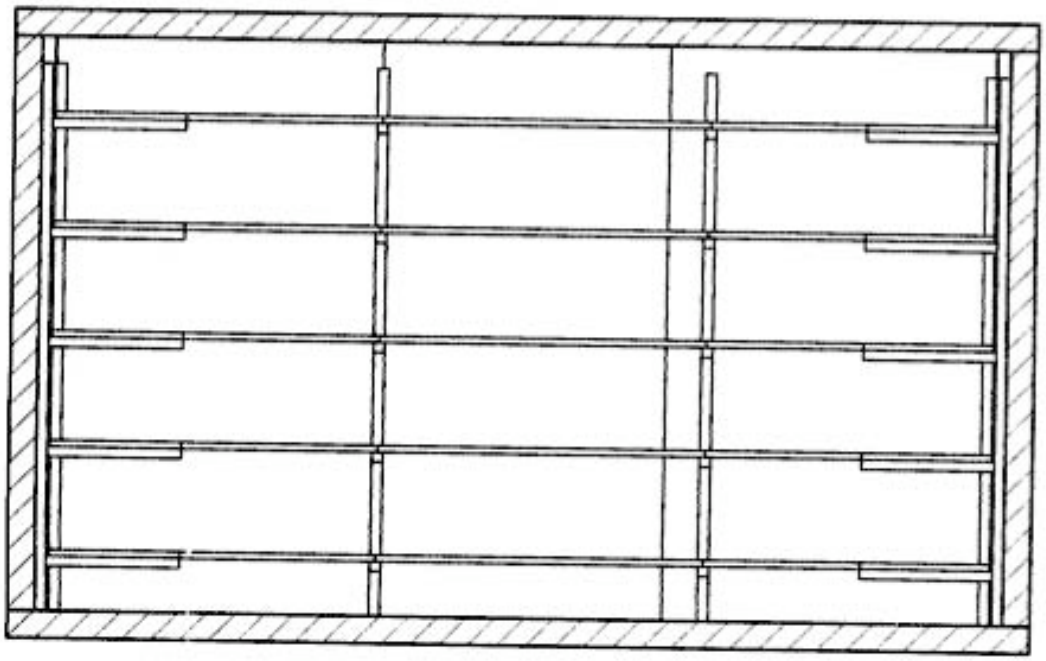
LAYOUT OF 30 M^3, WIC



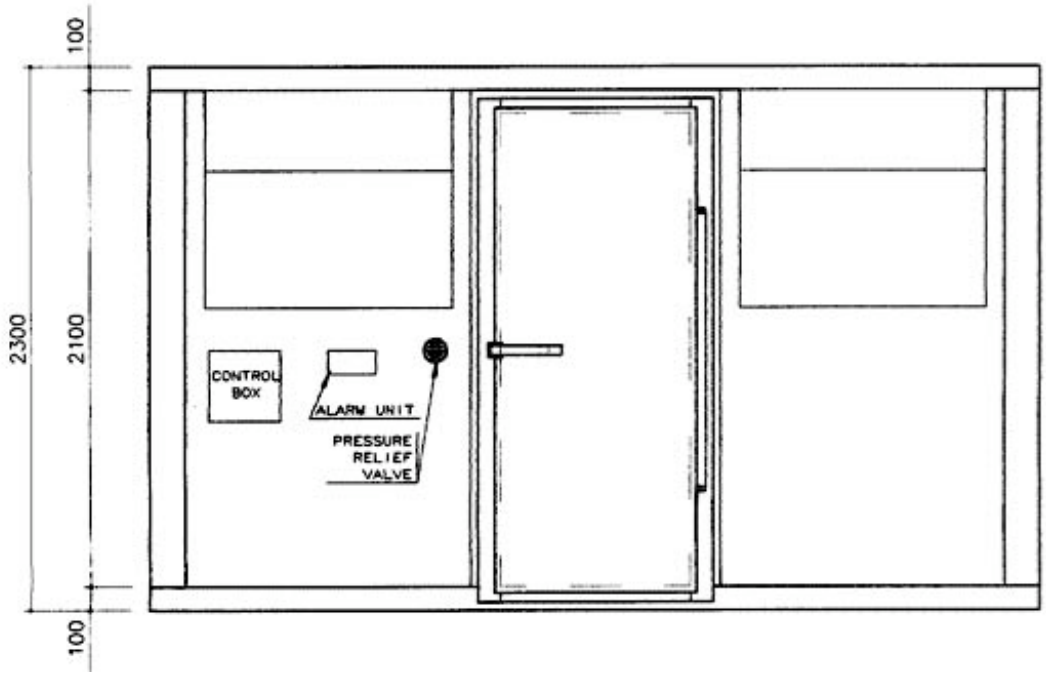
PLACEMENT OF SHELVES IN 30 M^3 WIC



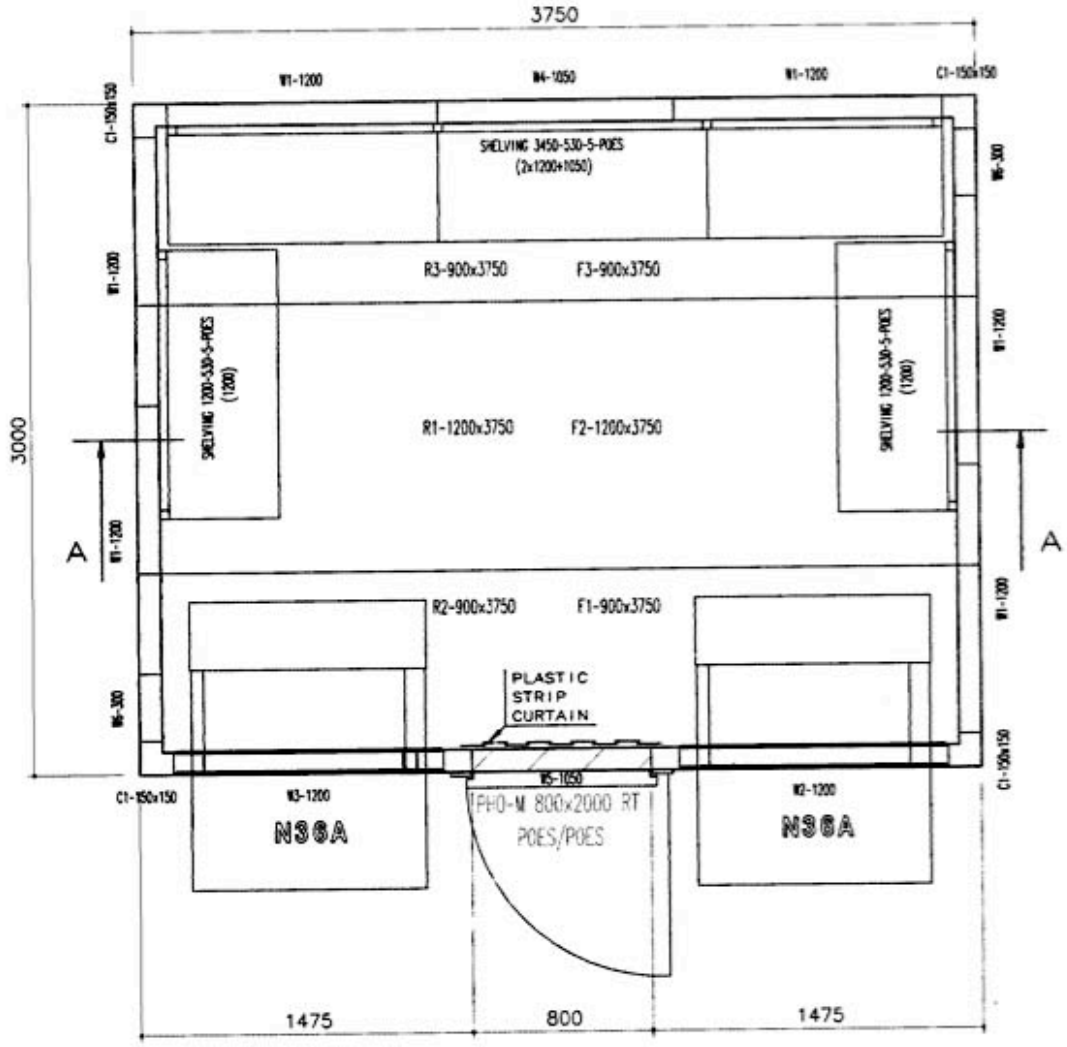
SIDE VIEW OF SHELVES IN 30 M^3 WIC



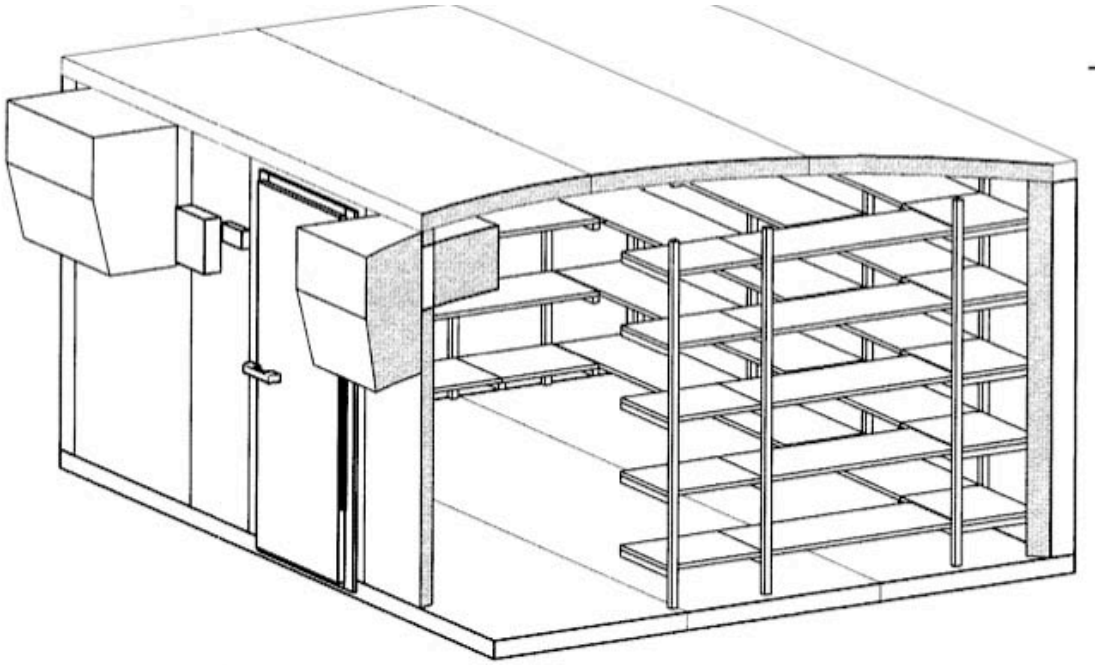
FRONT VIEW OF WIC 30 M^3 SIZE



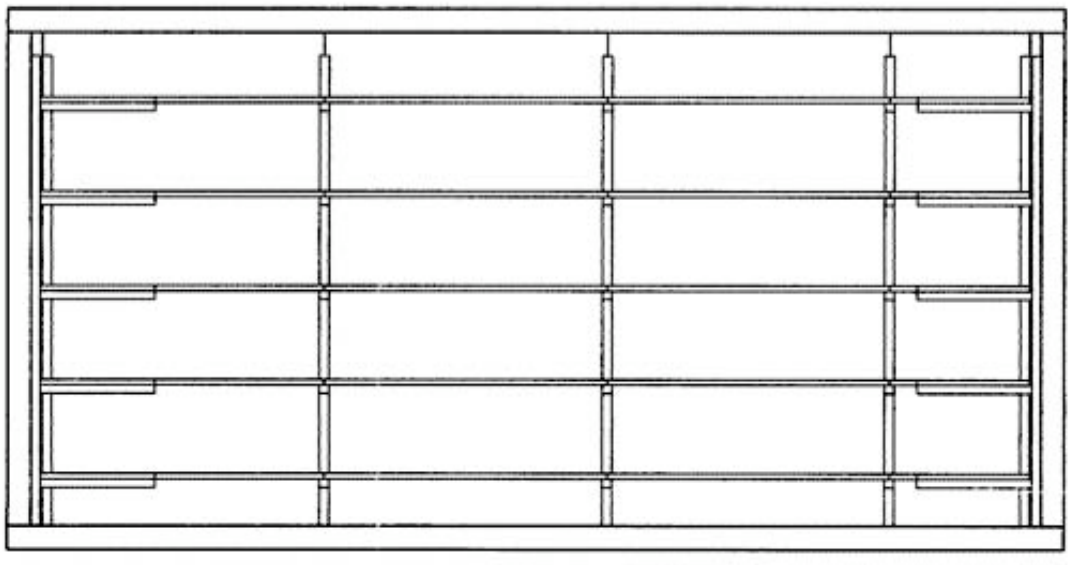
LAYOUT OF 20 M^3 WIF



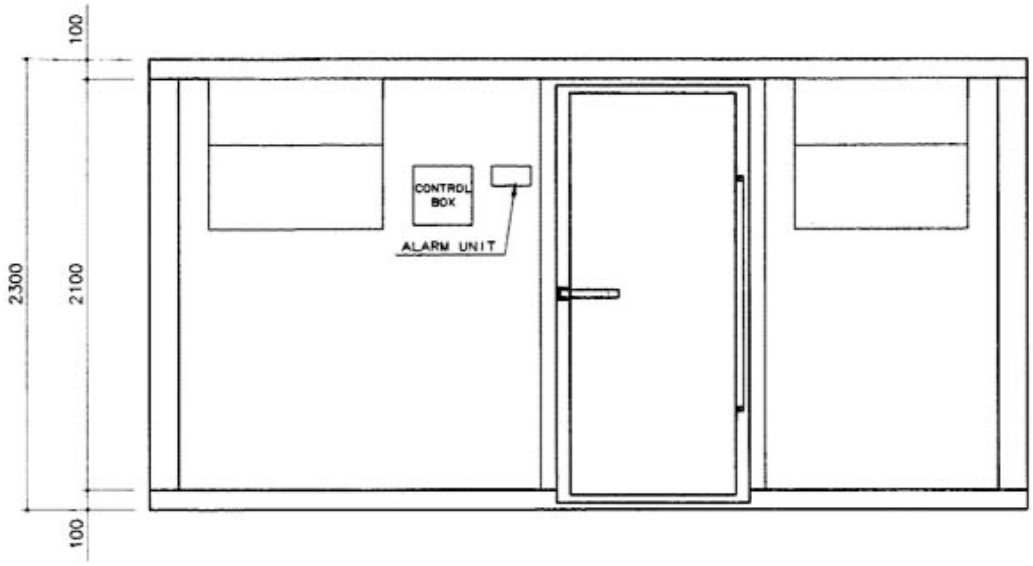
PLACEMENT OF SHELVES IN 20 M^3, WIF



SIDE VIEW OF SHELVES IN 20 M^3 WIF



FRONT VIEW OF WIF, 20 M^3 SIZE



7.2.4. Observations

The proposed site is located in the UNICEF supplies store, at the Medical Store Depot, Mumbai. The location is a 23.8 m x 15.75 m hall. The store presently hosts 2 WICs and 1 WIF, and a large quantity of empty vaccine packing boxes supplied by vaccine suppliers. The sites were proposed by the DADG. UNICEF will supply a new 20 m^3 WIF, and a 30 m^3 WIC, which will require an area of 4.5 m x 3.6 m and 3.75 m x 3 m respectively.

1) Presently, the proposed location hosts two WICs and one WIF.
2) One WIF has been converted to operate as a WIC.
3) The size of WIF (HUURRE) is 3.6 m x 3.5 m (2 cooling units).
4) The size of the other two WICs are 4.2 m X 4.2 m [converted from WIF (HUURRE)] (2 cooling units) and 9.1 m x 6.1 m (Blue star) (4 cooling units)
5) There are two very old small WICs and WIFs, (metal bodies), lying in the store and not in use. These will be shifted to another location when required.
6) There is a room constructed inside the hall, which hosts the WIF. The size of the room is 5.5 m x 11 m approximately.
7) The store is overlain with empty cold boxes supplied by the vaccine manufacturer, which are used to ship vaccine further to other states.
8) There is only one generator (11 KVA) which is connected to the WIF. The other two WICs are not connected to any generator. However, the power supply is reported to be fairly reliable.
9) The location is well connected to the road. The store is easily accessible for loading and unloading vaccine from the vaccine van.

10) The location is prone to flooding as the level of the floor is raised only 12 inches approximately from the level of road

11) Though the store is not exposed to direct sunlight, there is adequate natural light for packing vaccine.

12) The grid supply to the building is located in the room next to the store, and power to the WICs and WIF is supplied from the junction box, through a 50KVA stabilizer (3-phase, 4-pole).

13) The store in-charge's office is located here. There are no lockable shelves in the office however.

14) The proposed hall has no internal drainage system (water has to be drained manually through the door).

15) There is a water sink installed at the proposed location.

16) There is sufficient room (as per WHO norms and EVSM criteria) for vaccine packaging, to store cold boxes, diluents, syringes and droppers and a desk and a chair for the storekeeper (Please refer to room drawing in Annexure 5).

17) There is a provision for installation of a three-phase power supply for both the WIC and the WIF.

The general layout of vaccine store and placement of the WIC and the WIF is shown in Figure 15.

7.2.5. Status of Site

- ❑ Water supply and sanitary facilities

There is water supply at the proposed location. A sink is available for washing/cleaning, with a provision to evacuate water into an underground drain. However there is no provision for draining water from the floor in the hall.

- ❑ Drainage

Though the construction is fairly new, the drainage facility is poor. The building has an underground drainage facility outside the proposed location, however there is no drainage system inside the proposed rooms.

Constructing a raised plinth on which the WIF and WIC should be mounted will prevent eventual corrosion and safeguard against possible flooding. Before the plinth is laid assessment of the floor-loading capacity would have to be undertaken.

- ❑ Lighting

The proposed location has adequate lighting with large windows. There is no exposure to direct sunlight in the packing area.

- ❑ Ventilation, heating and cooling

The proposed location for the WIF and the WIC has a ceiling height of 3.85 m. It is well ventilated, with 4 large doors (each 2 m wide and 3 m high), and 4

ceiling windows above the door. Two extractor fans have been installed on one of the walls in the hall. However, additional extractor fans are required as it is a large-sized hall and it already hosts three cold rooms.

The location does not require any heating.

- Communications

The storekeeper's office (the proposed location has a telephone connection connected to the central epabx system, however, store does not have data telecommunication line (internet). The telephone and telecommunications lines (should be made available and) should be kept separate so that the storekeeper's office-line can eventually handle data transfer and the cold room lines can be linked to the temperature alarms and used for computerized monitoring.

- Security

The cold store facility is housed in a secured compound with guard services and the room is lockable. Security threat with respect to theft or vandalism is considered very low. Security risks with respect to fire are also low and there are 4 fire extinguishers installed in the hall.

- Vehicle access and loading convenience

Vehicles can directly access the proposed location. For the current store, packed vaccines are transported by trolley to the road adjacent to the store from where they are loaded onto the vehicles. The passageway from where vaccine is loaded into the vaccine van is broad and adequate for vaccine loading.

- Security during loading

The site is inadequately secured for loading and unloading of vaccine from the vaccine van as there is no loading bay or docking station. The vaccine is manually loaded and cold boxes are often subject to damage.

- Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of building or loading point.

- Loading dock

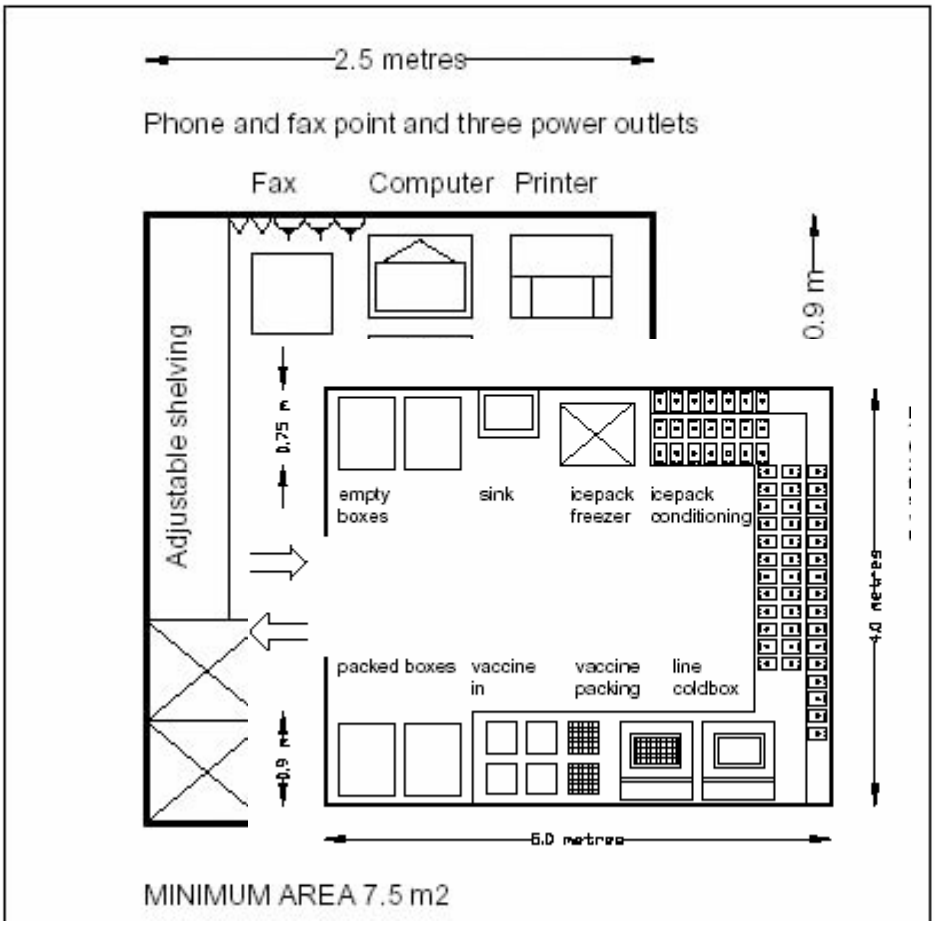
There is no loading dock, and there is no scope to build one.

- Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and at the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

The size of the storekeeper's office is approximately 4 m X 4 m and it has direct access to all the installed WICs, WIF and the proposed WIC/WIF location. Sufficient natural light enters the room. The furniture in the office



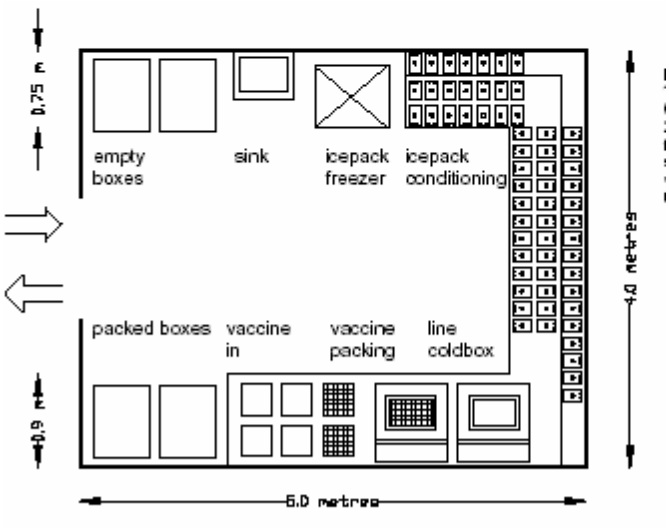
should be arranged as shown in Figure 1, which requires a minimum area of 7.5 m^2. Records can be maintained and kept in this office.

Figure 1: Proposed layout for storekeeper's office

- Packing area

With reference to Figure 2 an "L" shaped zone is available inside the hall for packing and unpacking of vaccine. This space is adequate for icepack conditioning and packing as per WHO-recommended norms. Utilization of this space will approximate that recommended in the WHO layout.

Figure 2: WHO recommended norms for icepack conditioning and packing of vaccine



- Proposed WIF

A space of 3.75 m x 3 m has been assigned at proposed location for assembling the 20 m^3 WIF. It should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness is proposed to provide a base for the WIF. Positioning of the WIF is indicated in Figure 15.

- Proposed WIC

A space of 4.5 m x 3.6 m has been assigned at proposed location for assembling the 30 m^3 WIC. It should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness is proposed to provide a base for the WIF. Positioning of the WIC is indicated in Figure 15.

- Storage of consumables

A space of 4 m x 5.5 m is available immediately adjacent to the WIC (smaller WIC). This requires storage shelving and is adequate for storage of diluents and immunisation-related consumables. No other location or facility is available for the storage of supplies except for the large lobby available in the room.

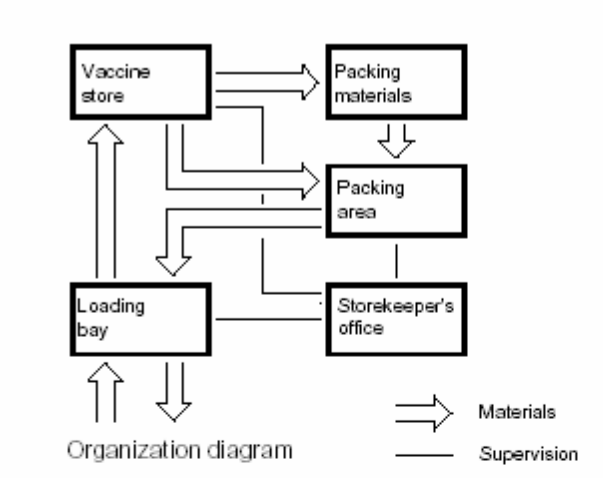
- Backup generator

An area behind the proposed location (open area) is available to construct a room for a back-up generator.

- Flow of personnel

The flow of movement of personnel associated with the management, reception and distribution and storage of vaccines at this store is shown in the Figure 3. The proposed layout is comparable to the model proposed in the WHO reference diagram.

Figure 3: Recommended organisational structure of cold store



Organization diagram

- Power situation and stability

The three-phase power supply from the national grid is reported to be adequate by the electrical technician at the site.

There is only one 15 KVA generator at the site, which can provide power backup to only one WIF in the event of longer power cuts.

- Electrical safety

Though safe electrical fittings have been provided, there is some security hazard in the form of open wiring at the distribution panel and fuse bypassing. Electricity supply to the proposed cold rooms is sourced from the central power supply board of building.

- Circuits with correct rating

Electrical circuits for the proposed cold rooms are fitted with isolators through switchover devices. Each WIF and WIC is wired internally to the central board of the building.

7.2.6. Recommendations linked to installation of cold room

1) The three-phase auto-start generator (supplied by UNICEF) to ensure backup to the existing WIFs and WICs and the newly supplied WIC and WIF.
2) A new three-phase 50 A electrical line should be drawn from the central power distribution panel of the building. This line should be drawn directly to a metering and distribution panel mounted near the generator set.
3) New three-phase distribution lines should be drawn from this distribution panel to both WIF and WIC. The panel should also be connected through an auto-start to the generator.

4) The electrical supply, distribution panels and circuit protection arrangement for all the cold room installations should be rewired, with appropriate connection to the auto-start generator set.

5) A reinforced concrete slab should be poured in the form of a raised plinth of 6 to 10 cm thickness at the location where the new WIF and WIC is to be located. This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing. It is to be noted, however, that the floors seem to be washed rarely.

6) The required electrical work, including a 3-phase dedicated power supply with a manual power cut-off switch for the cold room should be completed.

7.2.7. Recommendations as per guidelines, not linked to installation of cold room

1) Install telecommunication line (data line at the store keeper's desk).

2) Provide shelves in the storage room adjacent to the old WIC.

3) Furnish the storekeeper's office and include a secure lockable cabinet to keep records.

4) Minimise risk of fire by:

- Removal of unused inflammable materials from the premises.
- Improvement of electrical cabling for existing installations and fault-detection devices (contact breakers).

5) Install smoke detectors and sprinklers in the vaccine storage areas.

6) Build a hanger along the front of the UNICEF supply building. The hanger should not impair the passage of hot air from the ventilation apertures.

7) Install two water-resistant electrical sockets on the wall under the hanger.

8) Install a washing/cleansing bath water supply system and associated drainage points at the location where the new WIF is to be installed.

9) Install benches for icepack conditioning and packaging.

10) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIF and WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

7.2.8. Conclusion

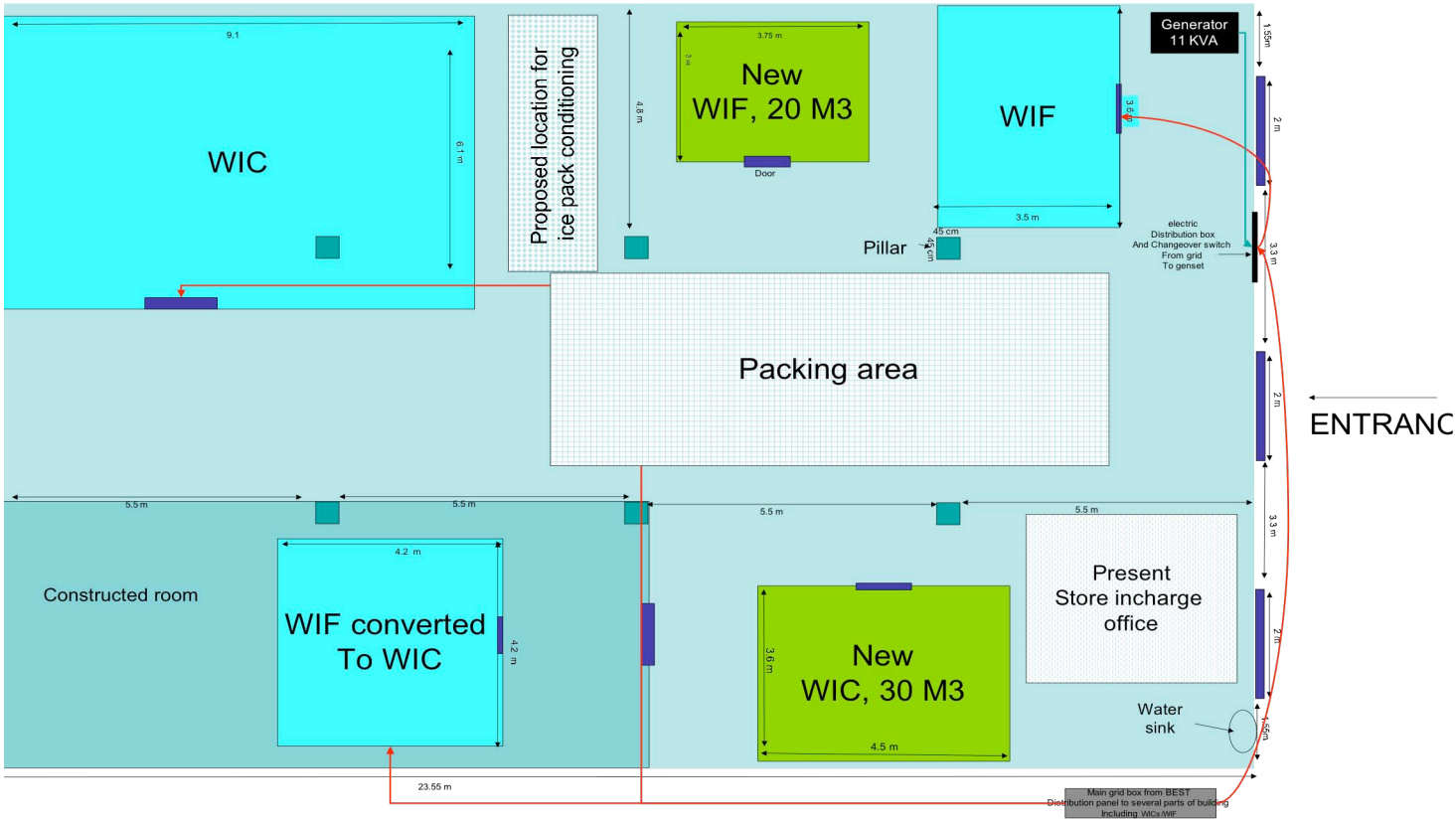
The Mumbai Medical Store depot has adequate space for installation of both WIC and WIF. Minor improvements are required in terms of protection from water and electrical fittings. The recommended standards as per the WHO

guidelines can be implemented at the proposed site except for the installation of air conditioners, as the facility may require a large-scale centralized air conditioning system.

Site is awaiting delivery of the WIC and the WIF. It is feasible to install the cold room subject to the completion of the civil and electrical work outlined in the recommendations linked to installation of WIF/WIC.

7.2.9. Drawing of site proposed

FIG. 15 LAYOUT OF MUMBAI COLD STORE FACILITY (GROUND FLOOR) AND SUGGESTED LOCATIONS FOR THE NEW WIF AND WIC



7.3. PUNE, MAHARASHTRA

SITE ASSESSMENT REPORT FOR INSTALLATION OF WIF IN PUNE

TO

MR. V B ABHANE, STATE COLD CHAIN OFFICER

AND

MAJOR DR. PRADEEP YASHWANT GAIKWAD, ASSISTANT DIRECTOR, FW

KUTUMB KALYAN BHAWAN

PUNE , MAHARASHTRA

SITE ASSESSMENT CARRIED ON 21 JUNE 2007

7.3.1. Background

UNICEF has designated IT Power India to inspect and install the walk-in cold rooms at 11 locations in India, which includes 4 Walk-in Freezers (WIF), 8 Walk-in-Coolers (WIC) and the replacement of 4 cooling units of 2 WIFs . With reference to the Special Service Agreement with UNICEF (number: SSA/INDQ/2007/00001015-0) following activities are to be performed by ITPI

1) Assist in identification and need assessment of suitable location at the proposed site selected by state government authorities/UNICEF
2) Installation of WIC/WIF at these proposed site as per guidelines provided in contract subject to:
3) All civil and electrical work at site completed by state government of respective sites.
4) All required material including WIC WIF parts are available on site (to be arranged by state government)

The evaluation parameters were evolved from The Guideline for Establishing or Improving Primary and Intermediate Vaccine Stores [(WHO/V&B 02.34) Version December 2002] and Equipment performance specifications and test procedures: Cold rooms and Freezer Rooms (WHO V&B 02.33).

Mr Ranjit Dhiman, Cold Chain Consultant, IT Power India visited the proposed sites for inspection.

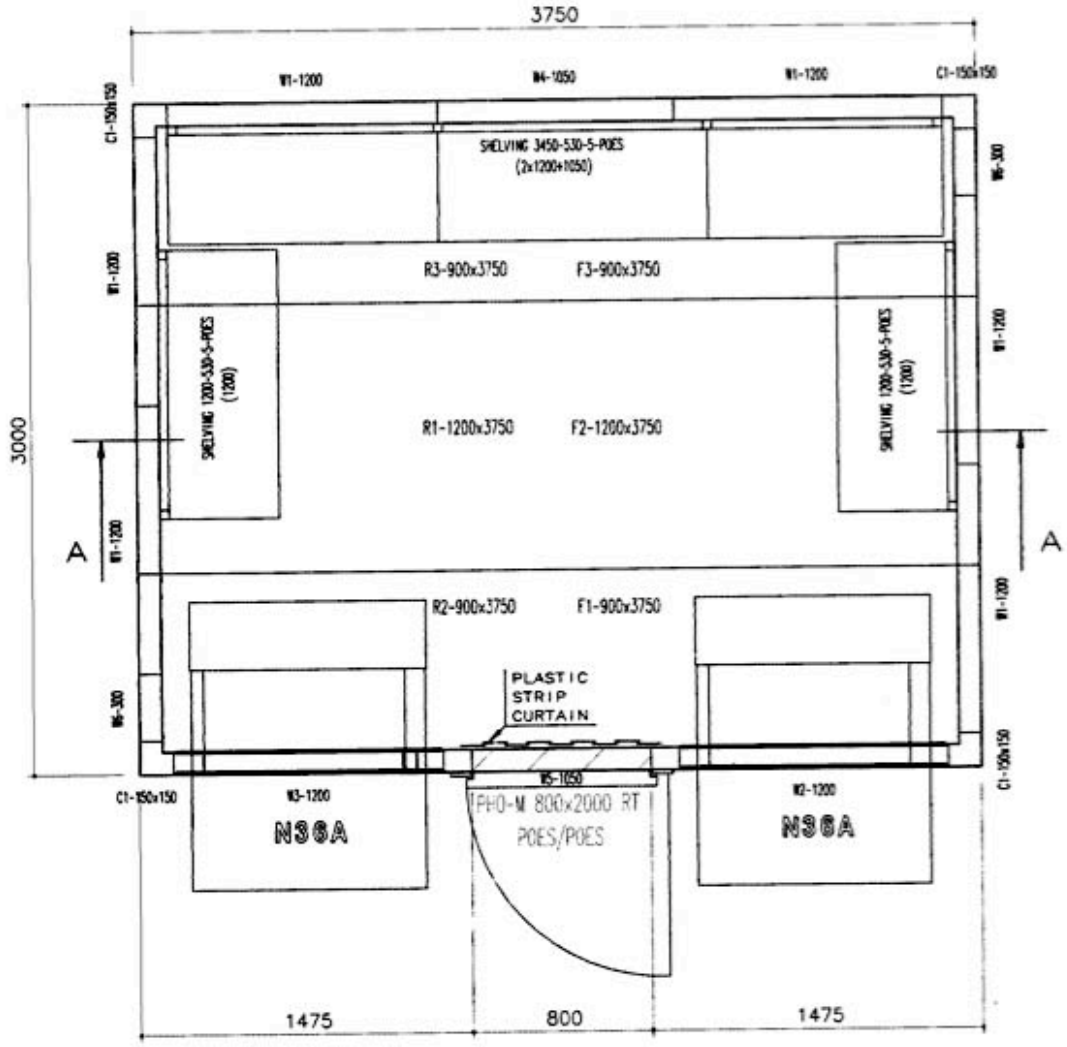
7.3.2. Specifications of cold room(s) to be installed

The site is due for installation of following cold room)s):

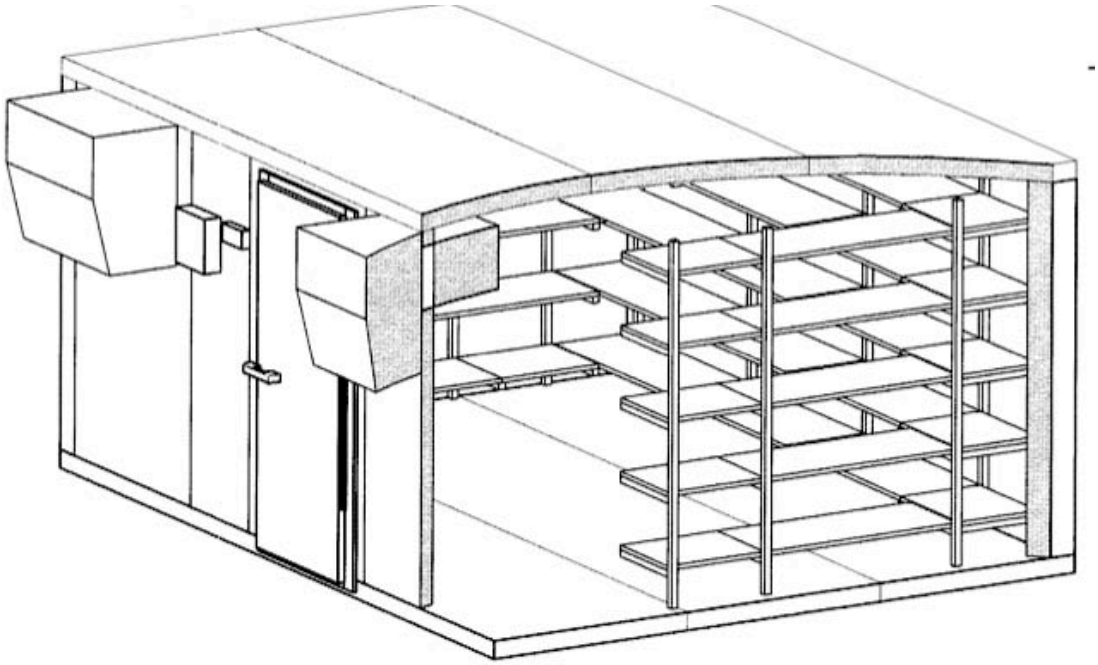
WIF of 20 Cubic Meter size, manufactured by HURREE.

7.3.3. Drawing of cold rooms

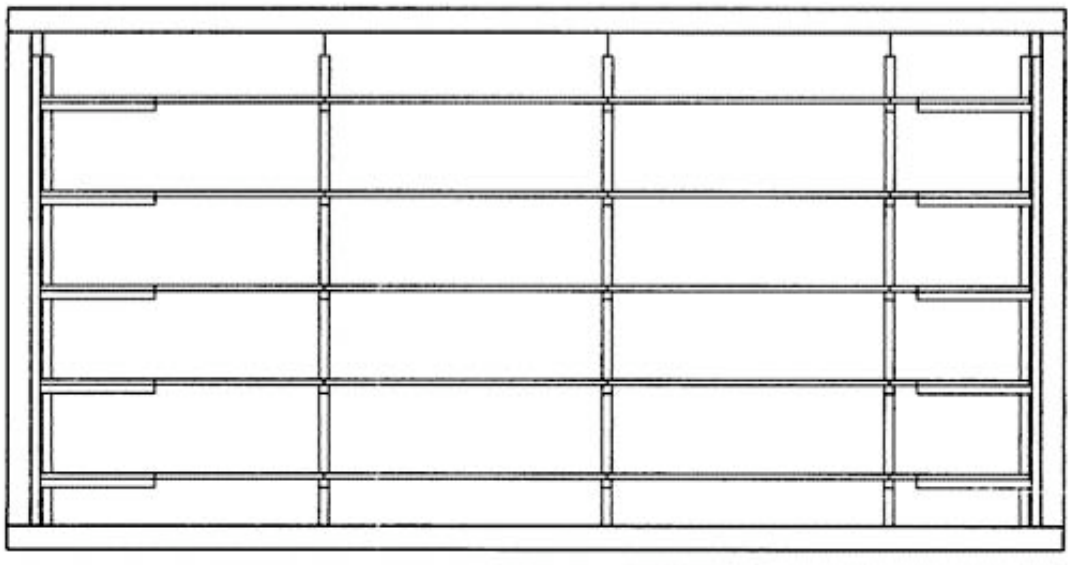
LAYOUT OF 20 M^3 WIF



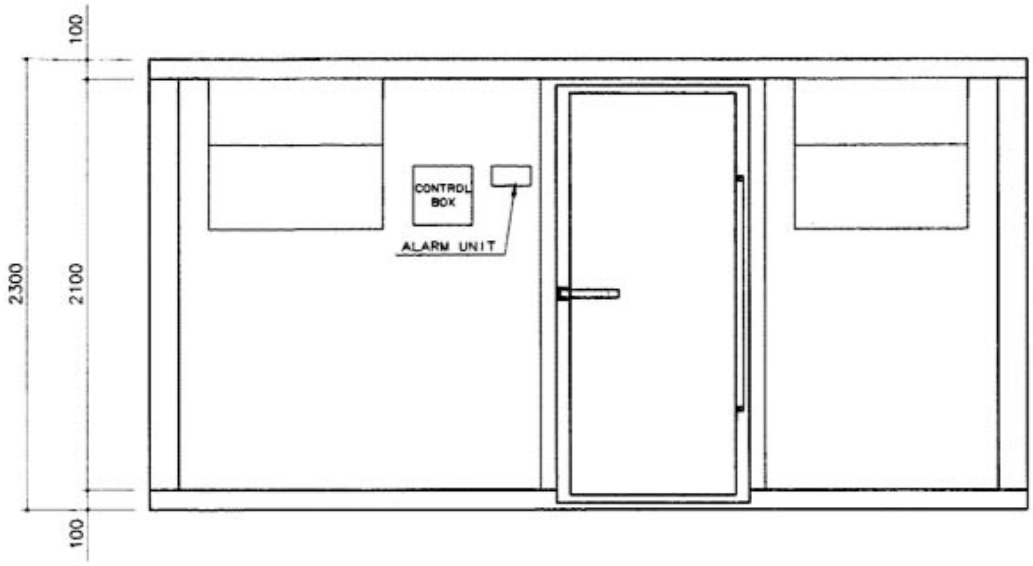
PLACEMENT OF SHELVES IN 20 M^3, WIF



SIDE VIEW OF SHELVES IN 20 M^3 WIF



FRONT VIEW OF WIF, 20 M^3 SIZE



7.3.4. Observations

The proposed site is located in the Leprosy Building on the ground floor, Kutumb Kalyan Bhawan, Pune. It consists of a set of three rooms with a total area of 13.5 m x 5.1 m. The store presently hosts 1 WIC and 1 DF, apart from hosting the CCO's and the store in-charge's offices.

See Figure 16 for a general layout of the Pune cold store facility.

UNICEF is to supply a new 20 m^3 WIF, which will require an area of 3 m x 3.75 m at the Kutumb Kalyan Bhawan, Pune. This site has been proposed by the CCO, and has been approved by the Additional Director. The size of the proposed location is 13.5 m x 5.1 m.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The new WIF has not yet delivered to the site.
2) Presently, the location already hosts one WIC.
3) The location has 3 rooms. During assessment, it was suggested by CCO that two of the walls be demolished to convert the facility into a big hall in order to host the new WIF (refer to Figure).
4) The size of currently installed WIC (HUURRE) is 3.9 m x 3.9 m (2 cooling units).
5) There is one WIF installed in another part of the premises, which has not been operational since last year.
6) There is one auto-start Kirlosker generator (10 KVA) which is connected to WIC.
7) The store has received a Servo Stabiliser and new generator (Kirlosker) (15 KVA capacity) which has not been unpacked.

8) The location is connected to road and is easily accessible for loading and unloading vaccine from vaccine van.
9) The location is safe from exposure to water, as the floor has been raised by 2 feet.
10) Though the store is not exposed to direct sunlight, there is adequate natural light for vaccine packing.
11) The grid supply distribution box of the building is located in the passageway, annex to the CCO's room, the distribution box is connected to the transformer installed in the Kutumb Kalyan Bhawan. Power is supplied to the other changeover switch, which is connected to the auto-start generator and servo voltage stabilizer. Power to the WIC is supplied from this changeover switch through the WIC control panel.
12) The CCO has suggested that a new electric three-phase line be laid from the transformer present to the building for new WIF.
13) The store in-charge's office is located at the proposed location. The office has lockable shelves.
14) The proposed location is well drained, as water cannot enter the building.
15) A sink has been installed at the proposed location.
16) There is in-sufficient space, as per WHO norms and EVSM criteria, for vaccine packaging, for the storekeeper and for consumables. (Refer to Figure).
17) There is a provision of a three-phase power supply for both the existing WIC and the proposed WIF.

7.3.5. Status of site

- Water supply and sanitary facilities

There is water supply at the proposed location. A sink is available for washing/cleaning with a provision to evacuate water into an underground drain.

- Drainage

The building is well drained, and water cannot enter the building since the flooring has been raised by 2 feet. The building has open drainage facility outside the proposed location.

- Lighting

The proposed location has adequate lighting since the room has large windows. There is no exposure to direct sunlight at the packing area.

- Ventilation, heating and cooling

The proposed location is well ventilated, with 1 large door of 1.6 meters wide and 3 meters height, and 4 windows (2 each in present rooms). There is no

provision for installation of extractor fans at given location, however 1 extractor fan has been installed already in a room hosting the stabilizer and additional provision can be made at the time reconstruction of building as required to host the WIF.

Extractor fans are required in on one side of the building, from where the cold room chiller air is evacuated.

The location does not require any heating.

- Communications

The storekeeper's office (at proposed location) has a telephone connection; however, the store does not have a data telecommunication line (internet). The telephone and telecommunications lines should be made available and kept separate so that the office line can eventually handle data transfer, and the cold room lines can be linked to the temperature alarms and used for computerized monitoring.

- Security

The cold store facility is housed in a secured compound with guard services and the space is lockable. Security threats with respect to theft or vandalism are considered very low; but incendiary risks are high as no fire extinguishers have been installed in the hall.

- Vehicle access and loading convenience

Vehicles can directly access the proposed location. Currently, for the already operating store, packed vaccines are transported by hand to the road adjacent to the store from where they are loaded onto the vehicles. The passageway where the vaccine is loaded into the van is broad and adequate for vaccine loading.

- Security during loading

The site is not adequately secured for loading and unloading of vaccine from vaccine van as there is neither a loading bay nor a docking station. The vaccines are loaded manually and the cold boxes are often subject to damages during this process.

- Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of the building or loading point.

- Loading dock

There is no loading dock, and there is no scope to build one.

- Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and at the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

The proposed size of the storekeeper's office is approximately 2.85 m X 3 m, and it has direct access to the installed WIC and proposed WIF location. Sufficient natural light enters the room. The furniture in the office should be arranged as shown in Figure 1, which requires a minimum area of 7.5 m^2. Records can be maintained and kept in this office.

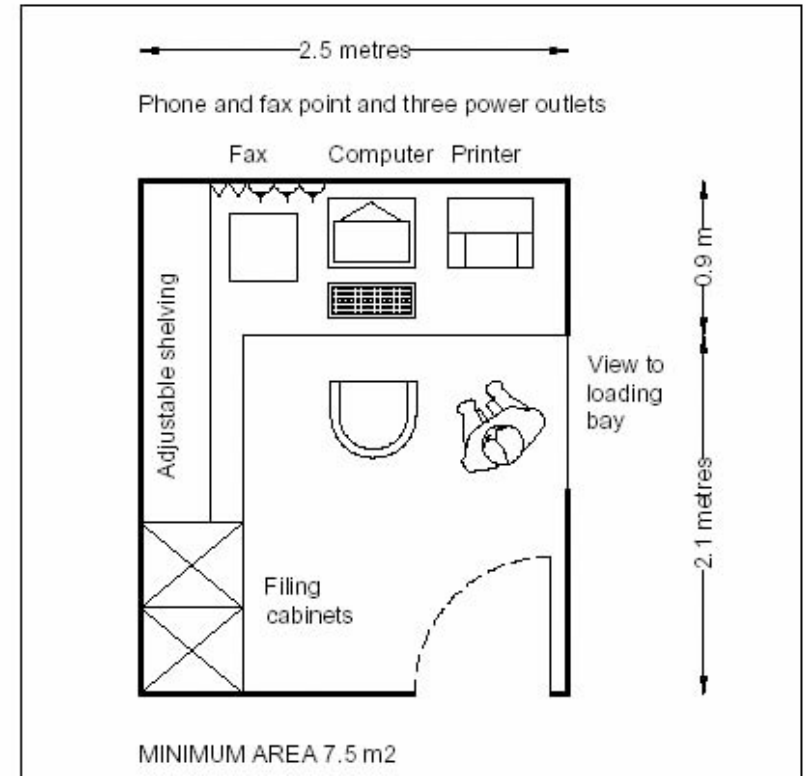
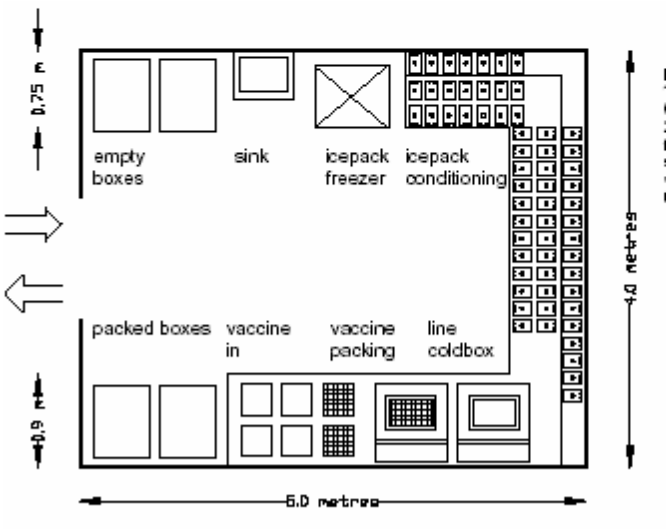


Figure 1: Proposed layout for storekeeper's office

- Packing area

The proposed location has inadequate space available for packing of vaccine as per the guidelines shown in Figure 2. This space is also inadequate for icepack conditioning and packing as per WHO-recommended norms.

Figure 2: WHO recommended norms for icepack conditioning and packing of vaccine



- Proposed WIF

A space of 3.75 m x 3 m is required at proposed location for assembling the 20 m^3 WIF. The WIF can be installed only after demolishing of two interior walls at the location. Refer to Figure 16 for the present layout of the facility and Figure 17 for the placement of WIF after alterations to the building.

The WIF should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness is proposed to provide a base for the WIF.

- Storage of consumables

The proposed site does not have adequate space to store the consumables in the same premises. At present the consumables are stored in separate building not too far away from cold store.

- Backup generator

Space is available to install the backup generator. There is an existing backup generator, which is operational and connected to the WIC. The space allotted for the generator is in a guarded compound, however a shed needs to be constructed to protect it from the rain.

- Power situation and stability

The quality of the three-phase power supply from the national grid is reported to be adequate by the electrician at the site.

There is one generator of 15 KVA operational on the site and an additional generator is due for installation for the new WIF. There is adequate power

backup in the event of longer power cuts, subject to stock and availability fuel to operate generator.

- ❑ Electrical safety

Since the site needs to be refurbished, the electrical wiring should be done keeping electrical standards in mind. The present electrical installations are good at some places and poor in the common areas (like the lobby, staircase, etc).

- ❑ Circuits with correct rating

Electrical circuits for the proposed cold rooms are fitted with isolators through switchover devices. The WIF should be wired internally to the central board of the building.

7.3.6. Recommendations linked to installation of cold room

1) Carry out the structural changes to the building by demolishing the inner walls as recommended in Figure .
2) Install a three-phase auto-start generator (supplied by UNICEF) to ensure backup to the existing WIFs and WICs and to the newly supplied WIC and WIF.

- ❑ Power Distribution

3) A new three-phase 50 A electrical line should be drawn from the transformer installed in the campus of the building. This line should be drawn directly to a metering and distribution panel mounted near the generator set.
4) New three-phase distribution lines should be drawn from this distribution panel to both WIF and WIC. The panel should also be connected through an auto-start to the generator.
5) Pour a reinforced concrete slab in the form of a raised plinth of 6 to 10 cm thickness at the location where the new WIF is to be installed. This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing. It is to be noted, however, that the floors seem to be washed rarely.
6) Complete the required electrical work, including a three-phase dedicated power supply with a manual power cut-off switch for the cold room.

7.3.7. Recommendations as per guidelines, not linked to installation of cold room

1) Install two telecommunication lines (data lines at the store keeper's desk)
2) Furnish the storekeeper's office and include a secure lockable cabinet to keep records.
3) Minimise risk of fire by:

a. Installation of fire extinguishers next to WIC and new WIF.
b. Improvement of electrical cabling for existing installations and fault-detection devices (contact breakers).

4) Install smoke detectors and sprinklers in the vaccine storage areas.
5) Build a hanger along the front of the leprosy building. The hanger should not impair the passage of hot air from the ventilation apertures.
6) Install two water-resistant electrical sockets on the wall under the hanger.
7) Install benches for icepack conditioning and packaging.
8) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organization, to provide regular maintenance for the WIF, the WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

7.3.8. Conclusion

The proposed location for installation of WIF is of smaller size then required and it is not possible to set-up the store layout as per the WHO guidelines. Also alterations to the building might take much longer time then to cover the installation within the stipulated timeframe in the contract. The site has reliable power supply and demonstrated good maintenance of electrical standards with existing installed WIC and generator.

7.3.9. Drawing of site proposed

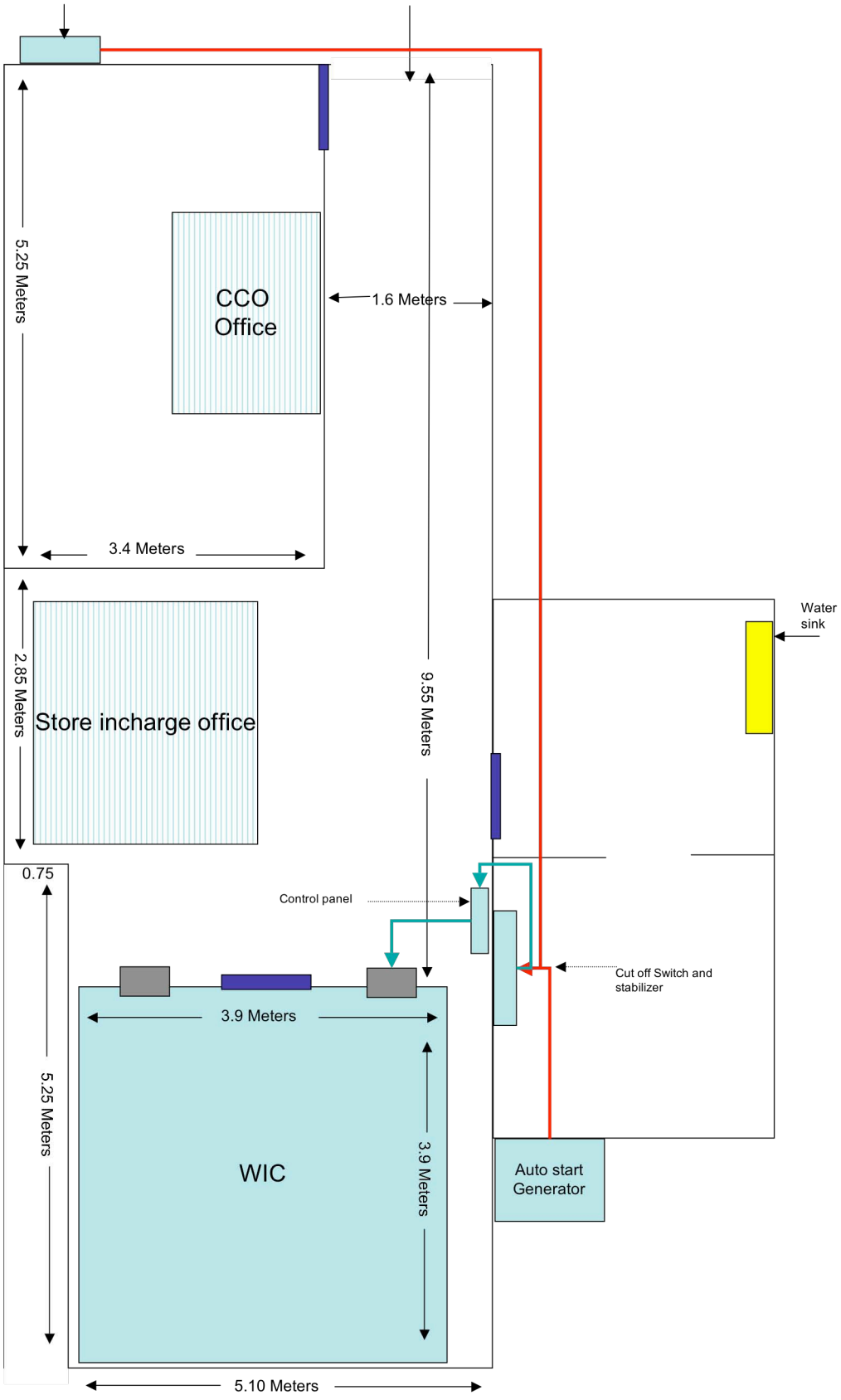


Figure 16 Present layout of Pune vaccine store facility

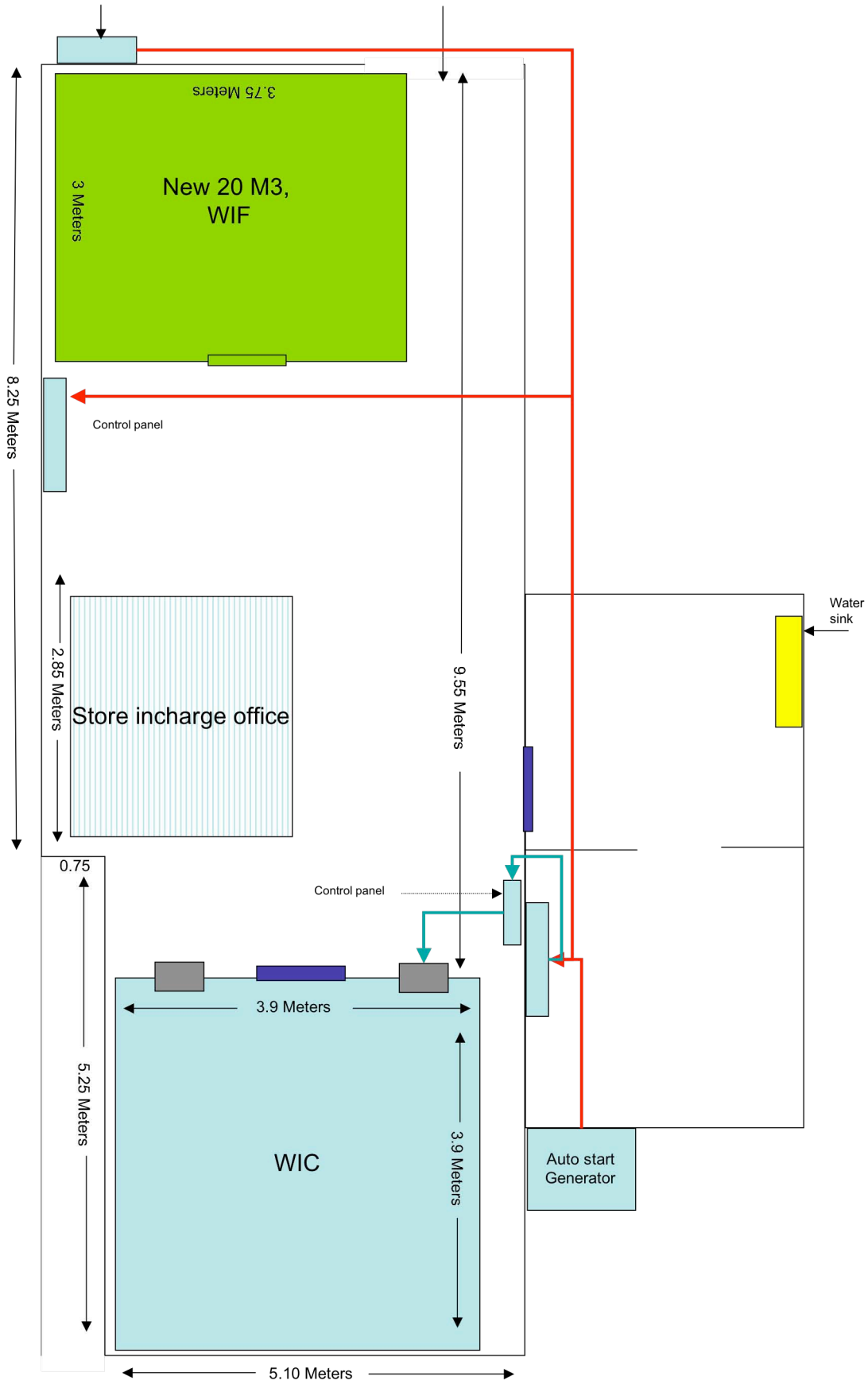


Figure17: Proposed alteration and suggested placement of 20 m^3 WIF

7.4. BELGAUM, KARNATAKA

SITE ASSESSMENT REPORT FOR INSTALLATION OF WIC IN BELGAUM

TO

MR. T. H. KABADE,
MECHANICAL CLASS 1, ENGINEER

DISTRICT HEALTH & FAMILY WELFARE OFFICE,
ASSISTANT DIRECTOR,
VACCINE INSTITUTE, TILAKWADI
BELGAUM CENTRAL – 590 006, KARNATAKA

SITE ASSESSMENT CARRIED ON 22 JUNE 2007

7.4.1. Background

UNICEF has designated IT Power India to inspect and install the walk-in cold rooms at 11 locations in India, which includes 4 Walk-in Freezers (WIF), 8 Walk-in-Coolers (WIC) and the replacement of 4 cooling units of 2 WIFs. With reference to the Special Service Agreement with UNICEF (number: SSA/INDQ/2007/00001015-0) following activities are to be performed by ITPI

1) Assist in identification and need assessment of suitable location at the proposed site selected by state government authorities/UNICEF
2) Installation of WIC/WIF at these proposed site as per guidelines provided in contract subject to:
3) All civil and electrical work at site completed by state government of respective sites.
4) All required material including WIC WIF parts are available on site (to be arranged by state government)

The evaluation parameters were evolved from The Guideline for Establishing or Improving Primary and Intermediate Vaccine Stores [(WHO/V&B 02.34) Version December 2002] and Equipment performance specifications and test procedures: Cold rooms and Freezer Rooms (WHO V&B 02.33).

Mr Ranjit Dhiman, Cold Chain Consultant, IT Power India visited the proposed sites for inspection.

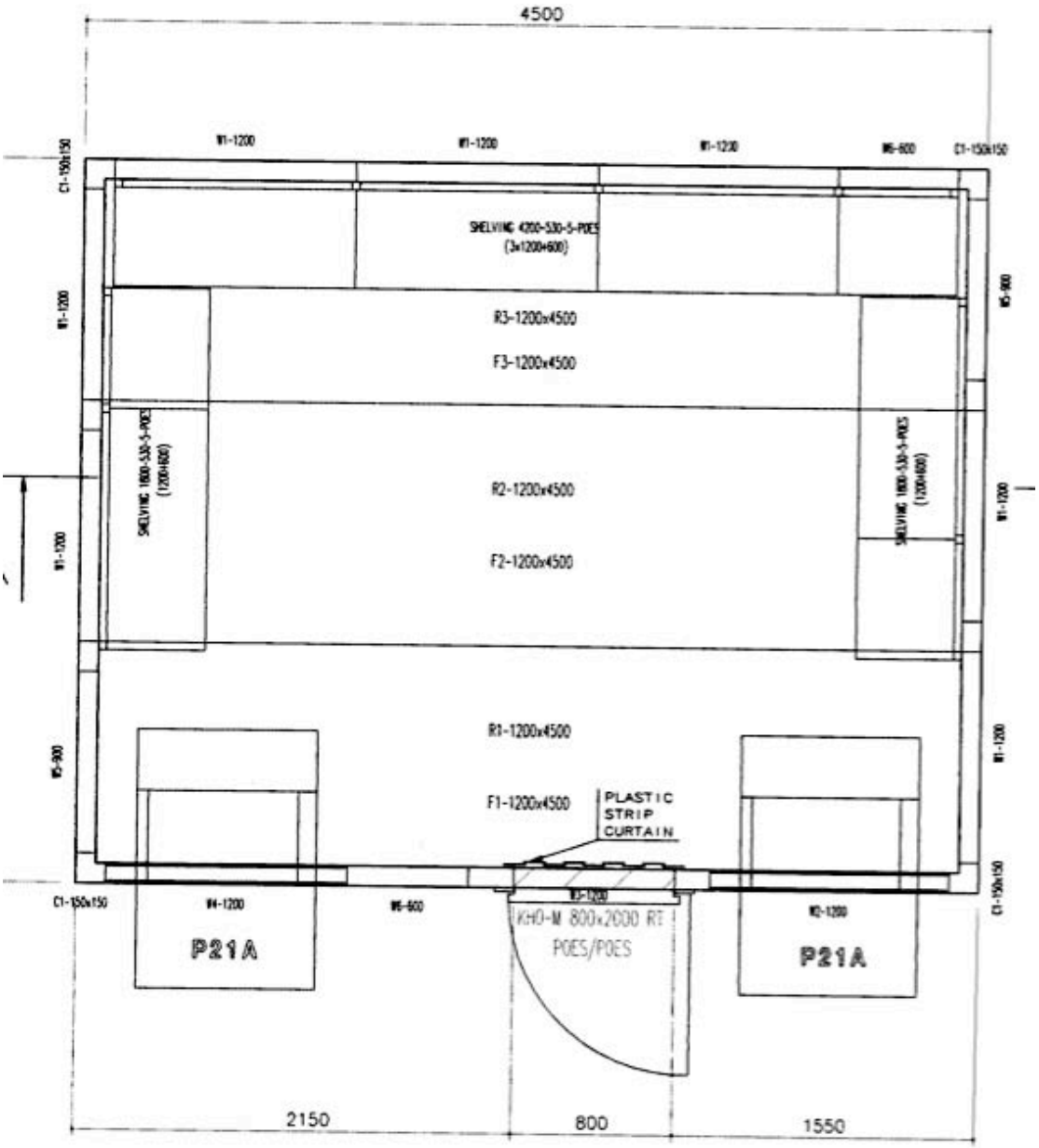
7.4.2. Specifications of cold room(s) to be installed

The site is due for installation of following cold rooms:

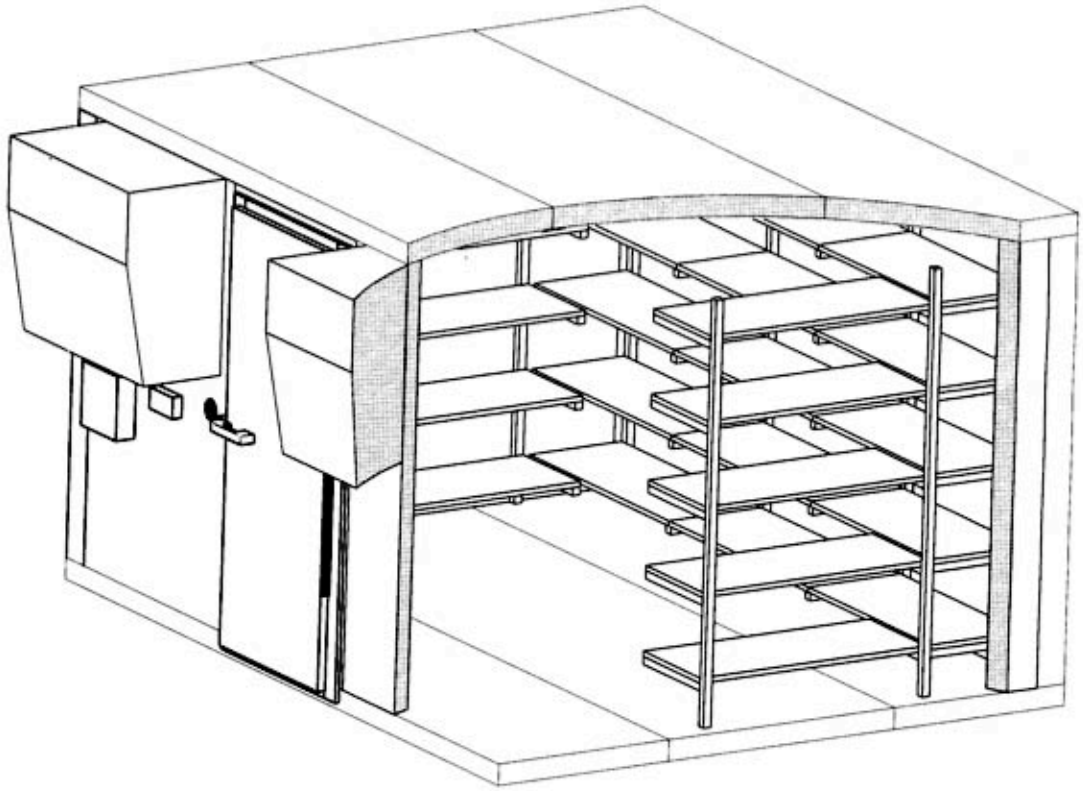
WIC of 30 Cubic Meter size, manufactured by HURREE.

7.4.3. Drawing of cold rooms

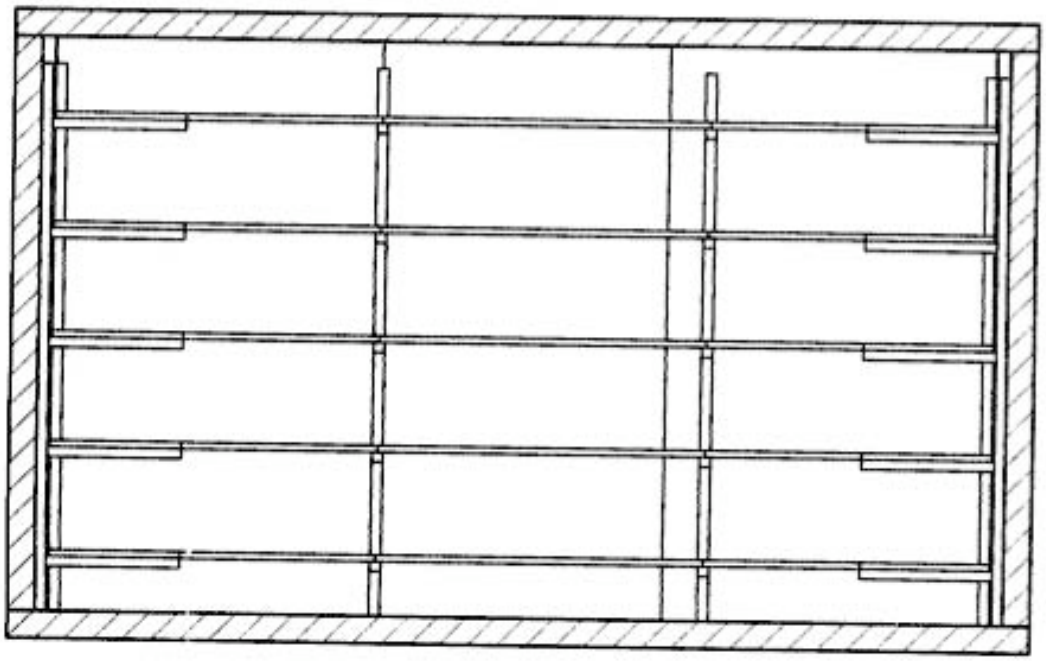
LAYOUT OF 30 M^3, WIC



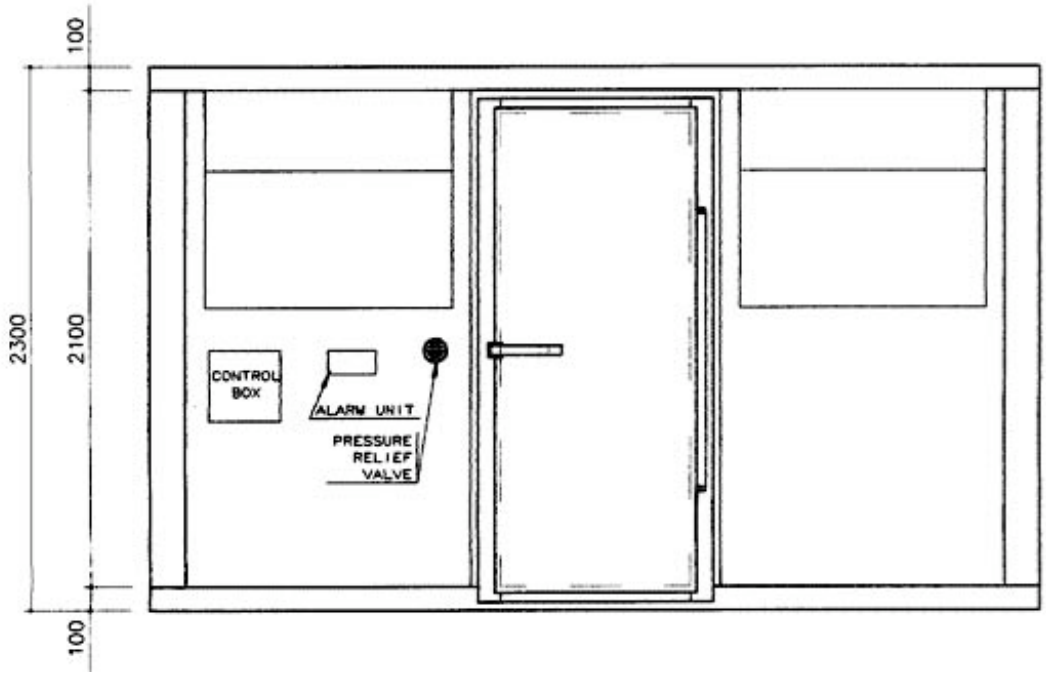
PLACEMENT OF SHELVES IN 30 M^3 WIC



SIDE VIEW OF SHELVES IN 30 M^3 WIC



FRONT VIEW OF WIC 30 M^3 SIZE



7.4.4. Observations

The proposed site is located in an old vaccine institute building at Tilakwadi, Belgaum. It is situated in a large hall. The site has been proposed by Mr. T. H. Kabade (Class 1, Mechanical Engineer) on behalf of the Additional Director, who was on tour on the day of the assessment. The proposed location is the only available site for the installation of the WIC.

The office presently hosts 1 WIC and 1 WIF, apart from ILRs and DFs.

A general layout of the site is provided in Figure 18.

UNICEF has supplied new 30 m^3 WIC, which will require an area of 4.5 m x 3.6 m at the old Vaccine Institute. The size of proposed location is 11 m x 7.32 m.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The new WIC has not yet delivered.
2) The site has received a generator (15 KVA) and a Servo stabilizer.
3) The proposed site is directly accessible from the broad road and the vaccine van can load and unload vaccine easily.
4) Presently, the vaccine store hosts one WIC and one WIF, which are installed very close to the proposed location for the WIC.
5) The proposed location has two large-sized machines installed on the ground floor, which belong to the old Vaccine Institute. The machines are not in use any more and can be removed to make space for the WIC.
6) The proposed hall has a large lockable gate. It also has good ventilation and adequate natural light.
7) The site is prone to be flooding as the floor level is the same as that of the road, and there is no protection from water entering the hall.
8) The facility has a centralized power supply system, with a generator providing power backup to the entire office. There is an old generator of 33.5 KVA rating, which provides power backup to the cold rooms.

7.4.5. Status of site

- ❑ Water supply and sanitary facilities

There is no water supply or water sink at the proposed location. However, there is a sink close by for washing/cleaning, with a provision to evacuate water into an underground drain. There is no provision for draining water from the floor in the hall.

- ❑ Drainage

The building is well drained considering that this is an old construction. It has an underground drainage system.

Constructing a raised plinth on which the WIF and WIC can be mounted will prevent eventual corrosion and provide a safeguard against possible flooding. Laying of plinth would require assessment of floor loading capacity

- ❑ Lighting

The proposed location has large windows that provide adequate lighting. There is no exposure to direct sunlight in the packing area.

- ❑ Ventilation, heating and cooling

The proposed location for the WIC has a ceiling height of more than 4 m. It is well ventilated, with 3 windows, 2 large doors (1.2 m wide and 2.82 m each door), and 10 ceiling windows above the door. However, extractor fans are required as there is no extractor fan in the hall.

Location does not require any heating.

- ❑ Communications

The storekeeper's office (at the present location, away from the proposed site) requires a telephone connection. The store does not have a data telecommunication line (internet). The telephone and telecommunications lines should be made available and kept separate so that the line can eventually handle data transfer and the cold room lines can be linked to the temperature alarms and be used for computerized monitoring.

- ❑ Security

The cold store facility is housed in a compound, which is neither guarded, nor is access monitored. However, the space allocated is lockable. Security threats with respect to theft or vandalism are considered high. Security risks with respect to fire are also high as there are no fire extinguishers installed in the hall.

- ❑ Vehicle access and loading convenience

Vehicles can directly access the proposed location. Currently, for the already operating store, packed vaccines are transported manually to the road adjacent to the store, from where they are loaded onto the vehicles. The passageway where the vaccine is loaded into the vaccine van is broad and adequate for vaccine loading.

- ❑ Security during loading

The site is not adequately secured for loading and unloading of vaccine from vaccine van as there is neither a loading bay nor a docking station. The vaccines are manually loaded and cold boxes are often subject to damages during this process.

- ❑ Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of building or loading point.

- Loading dock

There is no loading dock, and there is no scope to build one.

- Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and at the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

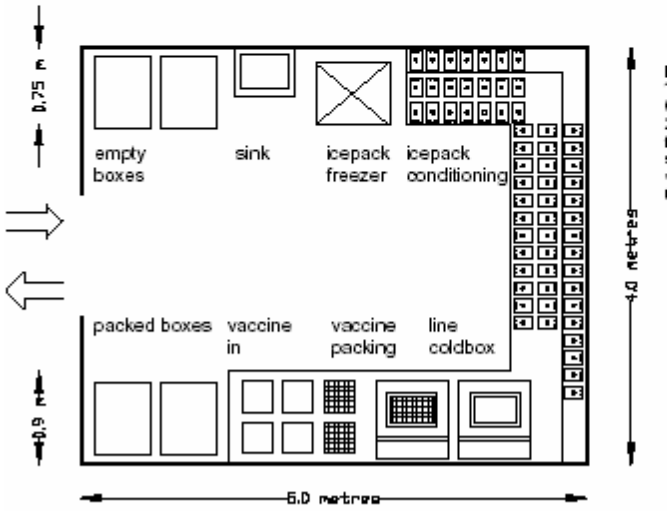
The present storekeeper's office is located in a separate room, which is adjacent to the proposed location. The office is in between the existing cold rooms and the proposed location. It is recommended that the office continues to function from the current location considering the easy access to the existing cold room installations.

The storekeeper's office has lockable shelves and records are kept safely.

- Packing area

With reference to Figure 2 an "L" shaped zone is available inside the hall for packing, unpacking of vaccine. This space is adequate for icepack conditioning and packing as per WHO-recommended norms. Utilisation of this space will approximate that recommended in the WHO layout.

Figure 2: WHO recommended norms for icepack conditioning and packing of vaccine



- Proposed WIC

A space of 4.5 m x 3.6 m has been assigned at proposed location for assembling the 30 m^3 WIC. It should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness should be poured to provide a base for the WIF. Positioning of the WIC is indicated in Figure 19.

- Storage of consumables

A 4 m x 4m area is available at the proposed location. It is adequate to store diluents and immunization-related consumables but shelves need to be constructed.

- ❑ Backup generator

The store has space next to the existing generator to install the new 15 KVA generator. It is adequate as the wiring to the existing cold rooms has already been done from this room and it is easy to manage two generators from the same access point.

- ❑ Power situation and stability

The quality of the three-phase power supply from the national grid was reported to be adequate by the mechanical engineer at the site.

There is an operational 33 KVA generator at the site, which is adequate power backup in the event of longer power cuts. Also a new 15 KVA generator for the new WIC is to be installed.

- ❑ Electrical safety

The electrical fittings are secure. Electricity supply to the proposed cold rooms is sourced from the central power supply board of the building.

- ❑ Circuits with correct rating

Electrical circuits for existing cold rooms are fitted with isolators through switchover devices. Each WIF and WIC is wired internally to the central board of the building.

7.4.6. Recommendations linked to installation of cold room

1) Install the three-phase auto-start generator (supplied by UNICEF) to ensure backup to the new WIC.
2) Remove the machinery installed in the proposed location, which belongs to old Vaccine Institute.
3) Remove the old furniture and other stationary presently kept at the proposed location.
4) Draw a new three-phase 50 A electrical line from the central power distribution panel of the building.
5) Draw it directly to a metering and distribution panel mounted near the generator set.
6) Draw new three-phase distribution lines from this distribution panel to the WIC. The panel should also be connected through an auto-start to the generator.
7) Pour a reinforced concrete slab in the form of a raised plinth of 6 to 10 cm thickness at the location where the new WIC is to be installed. This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing.

8) Complete the required electrical work, including a three-phase dedicated power supply with a manual power cut-off switch for the cold room.

7.4.7. Recommendations as per guidelines, not linked to installation of cold room

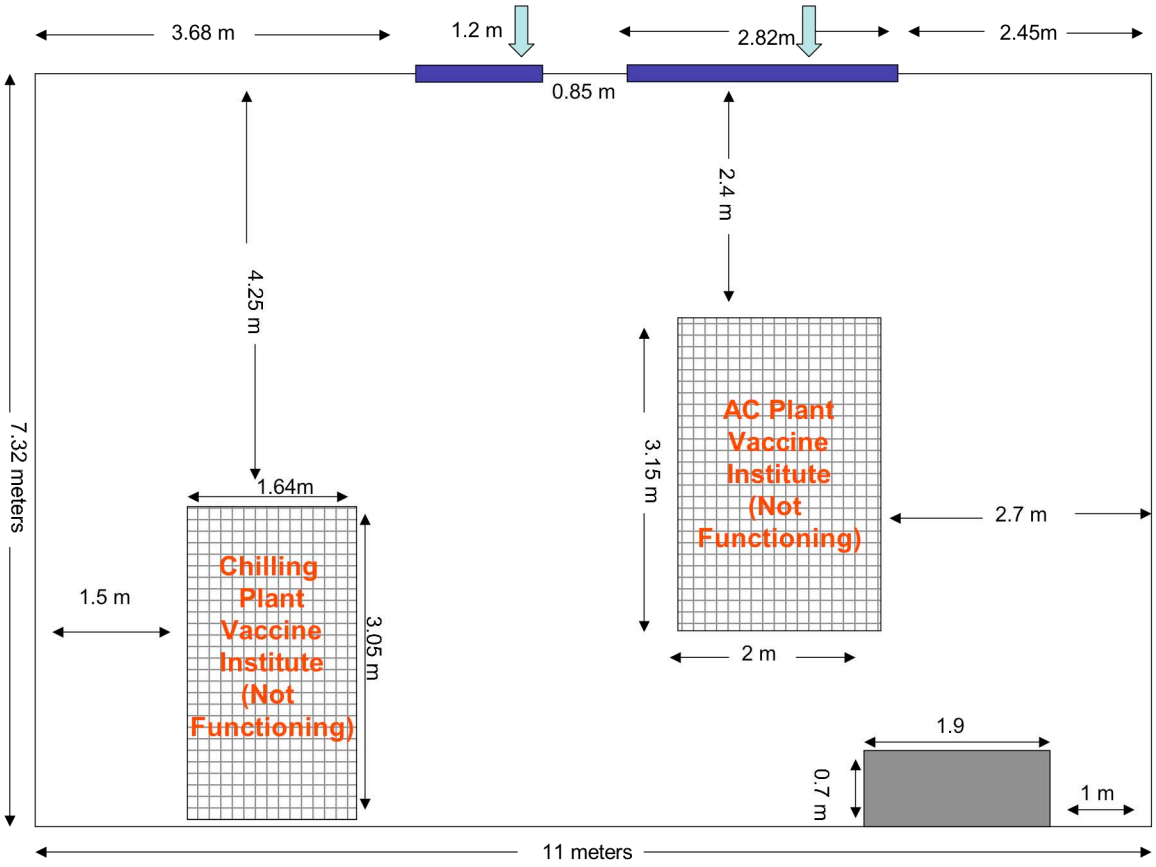
1) Install two telecommunication lines (data lines at the store keeper's desk, in a separate room where storekeeper's office is currently operational).
2) Provide shelves in the storage space adjacent to the new WIC.
3) Minimise risk of fire by:
    a. Removal of unused inflammable materials from the premises.
    b. Improvement of electrical cabling for existing installations and fault-detection devices (contact breakers)
    c. Installation of fire extinguishers at proposed location and in rooms hosting existing WIC, WIF and storekeeper's office.
4) Install smoke detectors and sprinklers in the vaccine storage areas.
5) Build a hanger along the front of the proposed location. The hanger should not impair the passage of hot air from the ventilation apertures.
6) Install two water-resistant electrical sockets on the wall under the hanger
7) Install a washing/cleansing water supply system and associated drainage points at the location where the new WIC is to be installed.
8) Install benches for icepack conditioning and packaging.
9) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIF and WICs and the generator sets, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

7.4.8. Conclusion

Though the site is located in an old building, it is well maintained. The proposed location is adequate for the installation and commissioning of the WIC. The required standards of the vaccine store as per the guidelines can be implemented at the proposed site. Apart from substantial civil required (of removing the machinery), the site is ready for the installation of the WIC.

7.4.9. Drawing of site proposed

Figure18: Present layout of proposed site for 30 M3 WIC



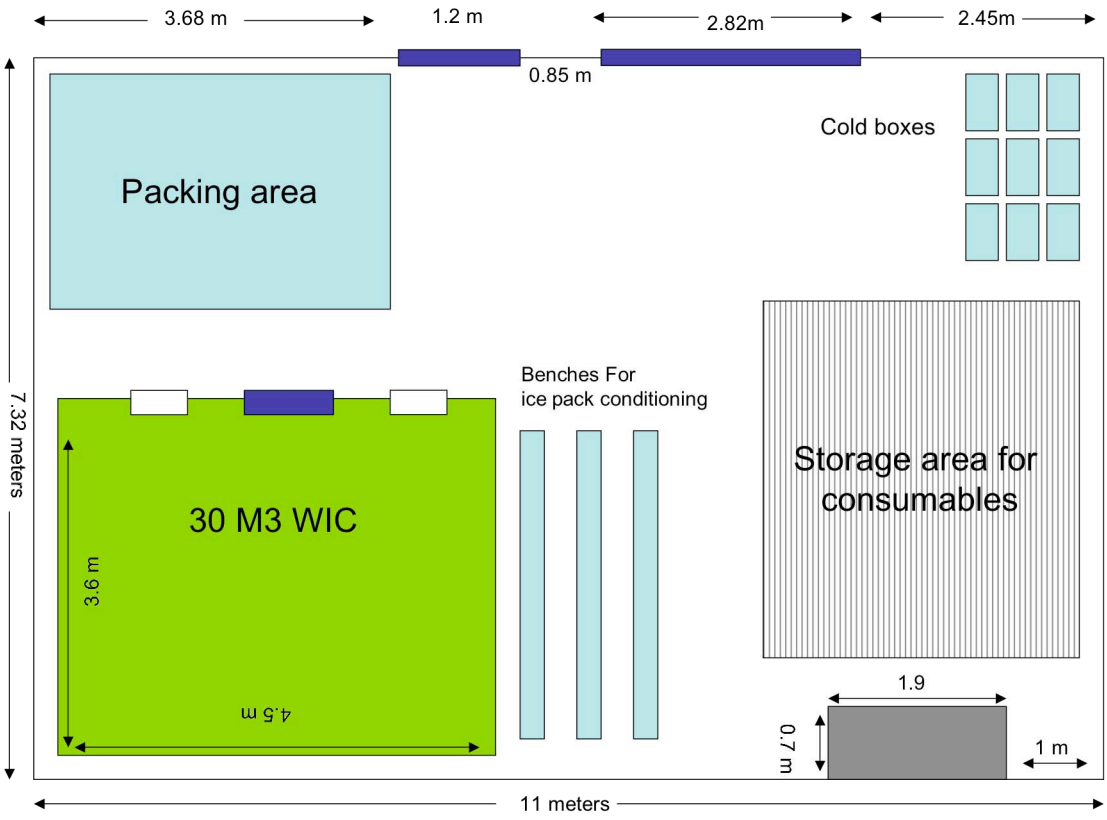


Figure19: Suggested layout of store (with removal of chiller and AC plant)

7.5. GULBARGA, KARNATAKA

SITE ASSESSMENT REPORT FOR INSTALLATION OF WIF IN GULBARGA

TO

DR. NALINI NAMOSHI,
DISTRICT HEALTH AND FAMILY WELFARE OFFICER

DR. SHYAM RAO PATIL, DISTRICT RCH OFFICER

MR. MOHAMMED MANSOOR AHMED, COLD CHAIN MAINTENANCE WING, INCHARGE OF BIGAR, GULBARGA, RAICHUR, KOPPAL

MR. VITHAL H BAWGI, REFRIGERATION MECHANIC, COLD CHAIN

DISTRICT HEALTH AND FAMILY WELFARE OFFICE, GULBARGA

SITE ASSESSMENT CARRIED ON 23 JUNE 2007

7.5.1. Background

UNICEF has designated IT Power India to inspect and install the walk-in cold rooms at 11 locations in India, which includes 4 Walk-in Freezers (WIF), 8 Walk-in-Coolers (WIC) and the replacement of 4 cooling units of 2 WIFs. With reference to the Special Service Agreement with UNICEF (number: SSA/INDQ/2007/00001015-0) following activities are to be performed by ITPI

1) Assist in identification and need assessment of suitable location at the proposed site selected by state government authorities/UNICEF
2) Installation of WIC/WIF at these proposed site as per guidelines provided in contract subject to:
3) All civil and electrical work at site completed by state government of respective sites.
4) All required material including WIC WIF parts are available on site (to be arranged by state government)

The evaluation parameters were evolved from The Guideline for Establishing or Improving Primary and Intermediate Vaccine Stores [(WHO/V&B 02.34) Version December 2002] and Equipment performance specifications and test procedures: Cold rooms and Freezer Rooms (WHO V&B 02.33).

Mr Ranjit Dhiman, Cold Chain Consultant, IT Power India visited the proposed sites for inspection.

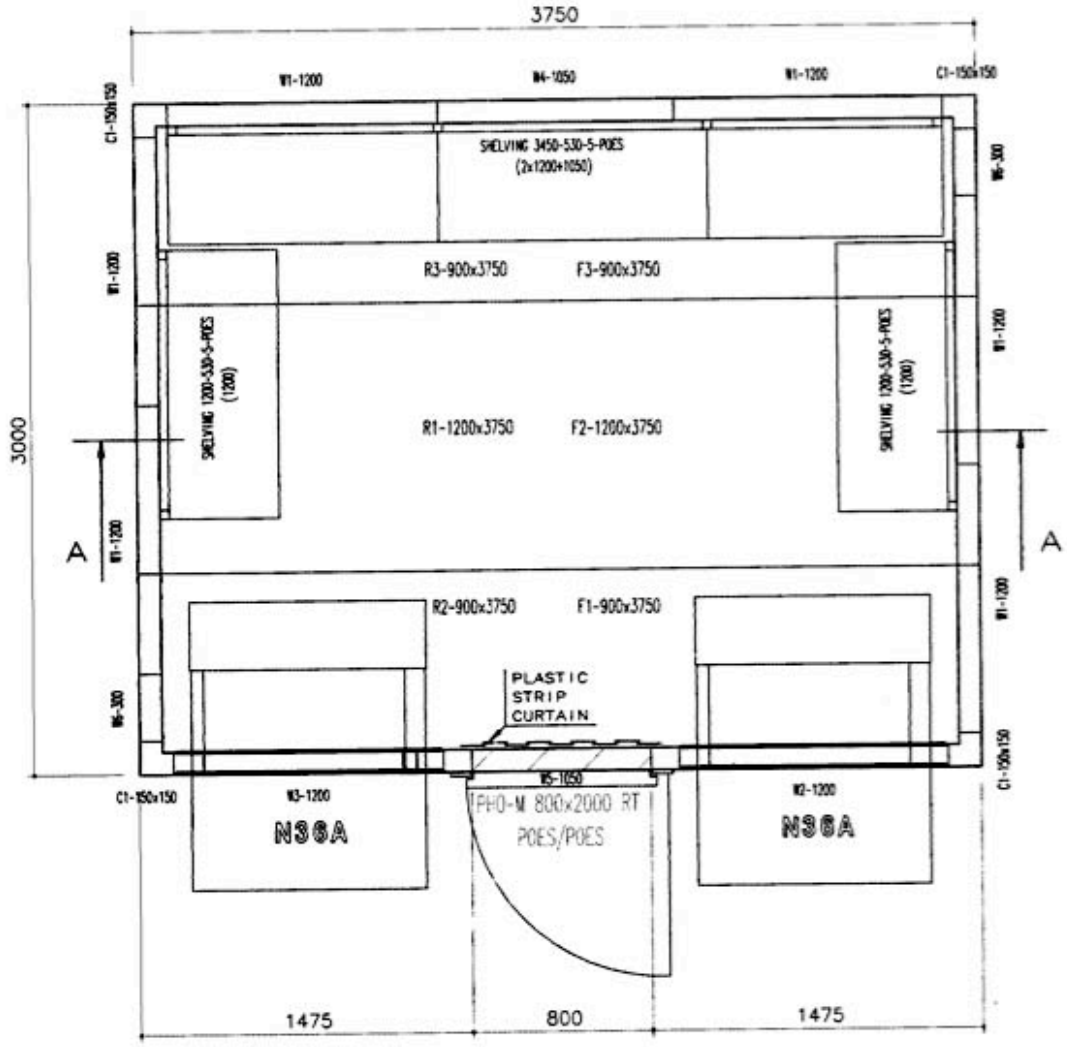
7.5.2. Specifications of cold room(s) to be installed

The site is due for installation of following cold rooms:

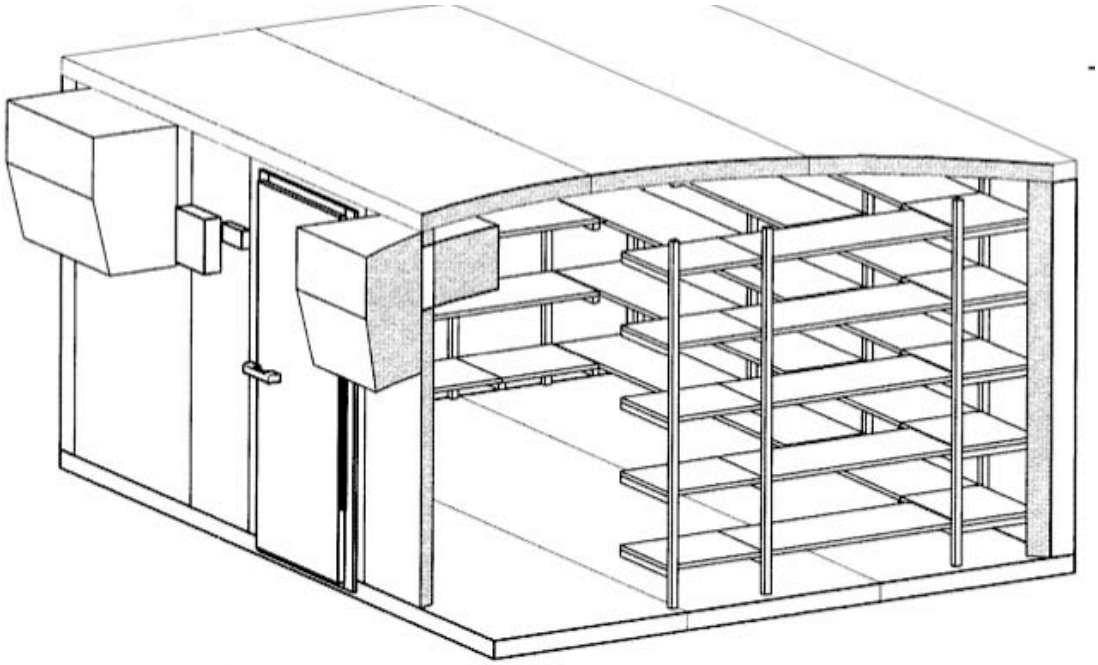
WIF of 20 Cubic Meter size, manufactured by HURREE.

7.5.3. Drawing of cold rooms

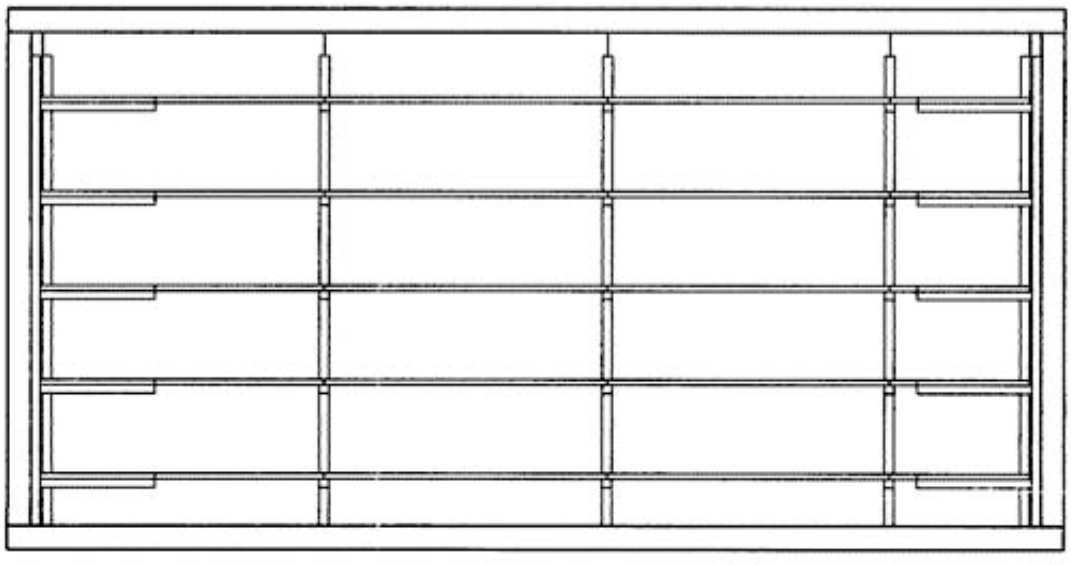
LAYOUT OF 20 M^3 WIF



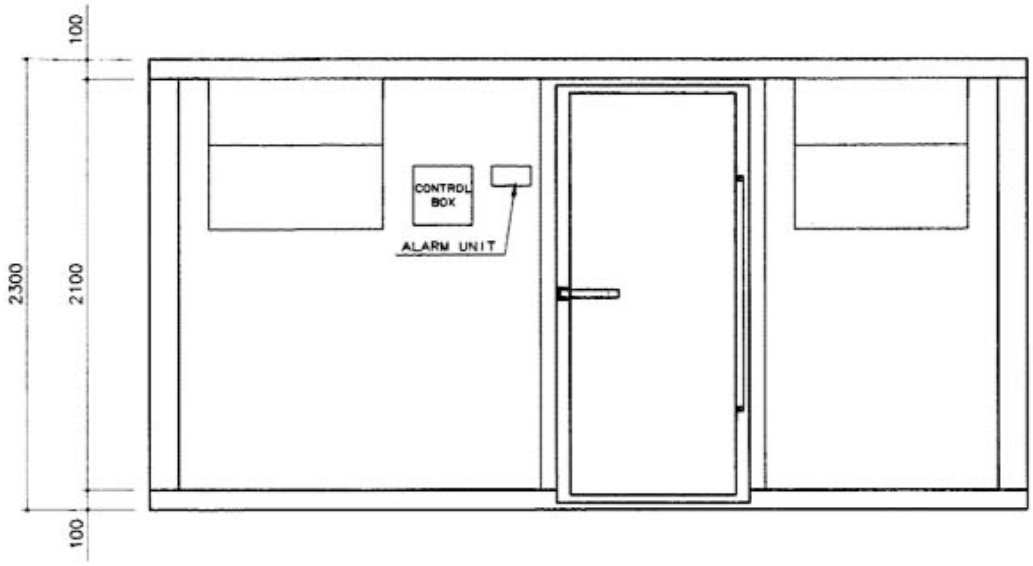
PLACEMENT OF SHELVES IN 20 M^3, WIF



SIDE VIEW OF SHELVES IN 20 M^3 WIF



FRONT VIEW OF WIF, 20 M^3 SIZE



7.5.4. Observations

The proposed site is located in the District Health and Family Welfare office, Gulbarga. The site has been proposed by Dr. Nalini Namoshi (DHO). The location for installation of a 20 m^3 WIF is in a drug warehouse adjacent to District Health Officer's office. The building was a hospital, which has been converted into an office and subsequently into a vaccine store.

See Figure 20 for a general layout along with the proposed location for the installation of WIF.

UNICEF has supplied new 20 m^3 WIF that will require an area of 3.75 m x 3 m. The size of proposed location is 14 m x 4.5m.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) There are 3 rooms available for the installation of the WIF but only one room is suitable for a freezer room.
2) There is an open space available for the installation of a generator opposite to the door.
3) The hall is long, and only a part of it is required for the WIF.
4) The building structure is very old and cannot be altered.
5) The entrance to the facility is only 1 wide. This may pose a problem for loading and unloading vaccine boxes. A suitable large veranda outside the proposed location is in use for packing vaccine.
6) The location does not have direct road access but is only reachable though another room at the entrance of building.
7) The electric supply is fairly stable. There is no dedicated three-phase electricity connection available for the WIF. However a fresh cable can

be drawn from an existing three-phase electric pole located next to the facility.

8) The site has not yet received the WIF but the Servo Stabiliser and Kirlosker Genset of 15 KVA size have been received.
9) The site is protected from water due to a 1-foot rise from internal veranda and 4 feet rise from ground level.
10) The room has 9 ventilators, 4 on each long side and 1 on west side. It also has 4 windows on the south side of the wall.

7.5.5. Status of site

- ❑ Water supply and sanitary facilities

There is no water supply or water sink at the proposed location. However, a sink is available near the proposed location for washing/cleaning with a provision to evacuate water into an underground drain. There is provision of draining water from the floor in the hall.

- ❑ Drainage

The building is well drained with the overall complex being of old construction. It has an underground drainage system.

Constructing a raised plinth on which the WIF and the WIC can be mounted will prevent eventual corrosion and provide a safeguard against possible flooding. Laying of plinth would require assessment of floor loading capacity.

- ❑ Lighting

The proposed location has large windows that provide adequate light. There is no exposure to direct sunlight at the packing area.

- ❑ Ventilation, heating and cooling

The proposed location for the WIF has a ceiling height of more than 4 meters. It is well ventilated, with 9 ventilators and 4 windows. However, two extractor fans are required.

Location does not require any heating.

- ❑ Communications

The storekeeper office is located in a separate room, which has telephone lines. However, the store does not have data telecommunication line (internet). The telephone and telecommunications lines (should be made available and) should be kept separate so that the storekeeper's office line can eventually handle data transfer and the cold room lines can be linked to the temperature alarms and used for computerised monitoring.

- ❑ Security

The cold store facility is housed in a secured compound with guard services and the room is lockable. Security threats with respect to theft or vandalism are considered very low; though risks with respect to fire are high as no fire extinguishers have been installed in the hall.

- Vehicle access and loading convenience

Vehicle cannot reach the store directly. The vaccine is carried manually in cold boxes from the road through the administrative office to the store.

- Security during loading

The site is not adequately secured for loading and unloading of vaccine from vaccine van as there is neither a loading bay nor a docking station. The vaccine is loaded manually and the cold boxes are often subject to damage during this process.

- Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of building or loading point.

- Loading dock

There is a no loading dock but there is a scope of building one. The loading dock should be constructed next to the exit gate of the building where vaccine van can dock for easy loading and unloading of vaccine.

- Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and in the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

The present storekeeper's office is located in a separate room, which is adjacent to the proposed location. The office is in the middle of the existing cold rooms and proposed location and has an easy access to the other existing cold room installations. The storekeeper's office has lockable shelves and records are kept safely.

- Packing area

The proposed location does not have any space for packing of vaccine. However, there is ample space available outside the room for proper packing of vaccine and ice pack conditioning.

- Proposed WIF

A space of 3.75 m x 3 m is required at proposed location for assembling the 20 m^3 WIF. It should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness should be poured to provide a base for the WIF. Positioning of the WIF is indicated in Figure 20.

- Storage of consumables

There is no separate space available for storage of consumables. At present consumables are stored in drug warehouse and the available space outside the proposed location.

- Backup generator

The new 15 KVA generator can be installed in a road accessible space located next to the proposed site. A shed needs to be constructed to protect it from the rain.

- ❑ Power situation and stability

The quality of the three-phase power supply from the national grid is reported to be adequate by the mechanical engineer. A backup generator for cold room is available for installation.

- ❑ Electrical safety

The distribution panel and control circuit needs to be installed on the wall next to the proposed WIF location. The electrical fittings are securely provided with the construction of building.

7.5.6. Recommendations linked to installation of cold room

1) Install the three-phase auto-start generator (supplied by UNICEF) to ensure backup to the newly supplied WIF.

- ❑ Power distribution

2) A new three-phase 50 A electrical line should be drawn from the electric pole available near to the proposed site. This line should be drawn directly to a metering and distribution panel mounted near the generator set.
3) New three-phase distribution lines should be drawn from this distribution panel to WIF. The panel should also be connected through an auto-start to the generator.
4) Pour a reinforced concrete slab in the form of a raised plinth of 6 to 10 cm thickness at the location where the new WIF is to be installed. This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing. It is to be noted, however, that the floors seem to be washed rarely.
5) Complete the required electrical work, including a three-phase dedicated power supply with a manual power cut-off switch for the cold room.

7.5.7. Recommendations as per guidelines, not linked to installation of cold room

1) Install two telecommunication lines (data lines at the store keeper's desk).
2) Minimise risk of fire by:
    a. Removal of unused inflammable materials from the premises.
    b. Improvement of electrical cabling for existing installations and fault-detection devices (contact breakers)

c. Installation of fire extinguishers at the proposed location and existing cold room installations.

3) Install smoke detectors and sprinklers in the vaccine storage areas.
4) Build a hanger along the front of the building at the vaccine loading area.
5) Install two water-resistant electrical sockets on the wall under the hanger
6) Install a washing/cleansing water supply system and associated drainage points at the location where the new WIF is to be installed.
7) Install benches for icepack conditioning and packaging in the veranda outside the proposed location.
8) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIF and WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

7.5.8. Conclusion

Though the proposed site is small, there is no other alternative for the installation of new WIF. There is ample space available in the veranda for packing of vaccine and ice pack conditioning. Once the electricity line is drawn and the power distribution box has been installed, the location is ready for installation.

7.5.9. Drawing of site proposed

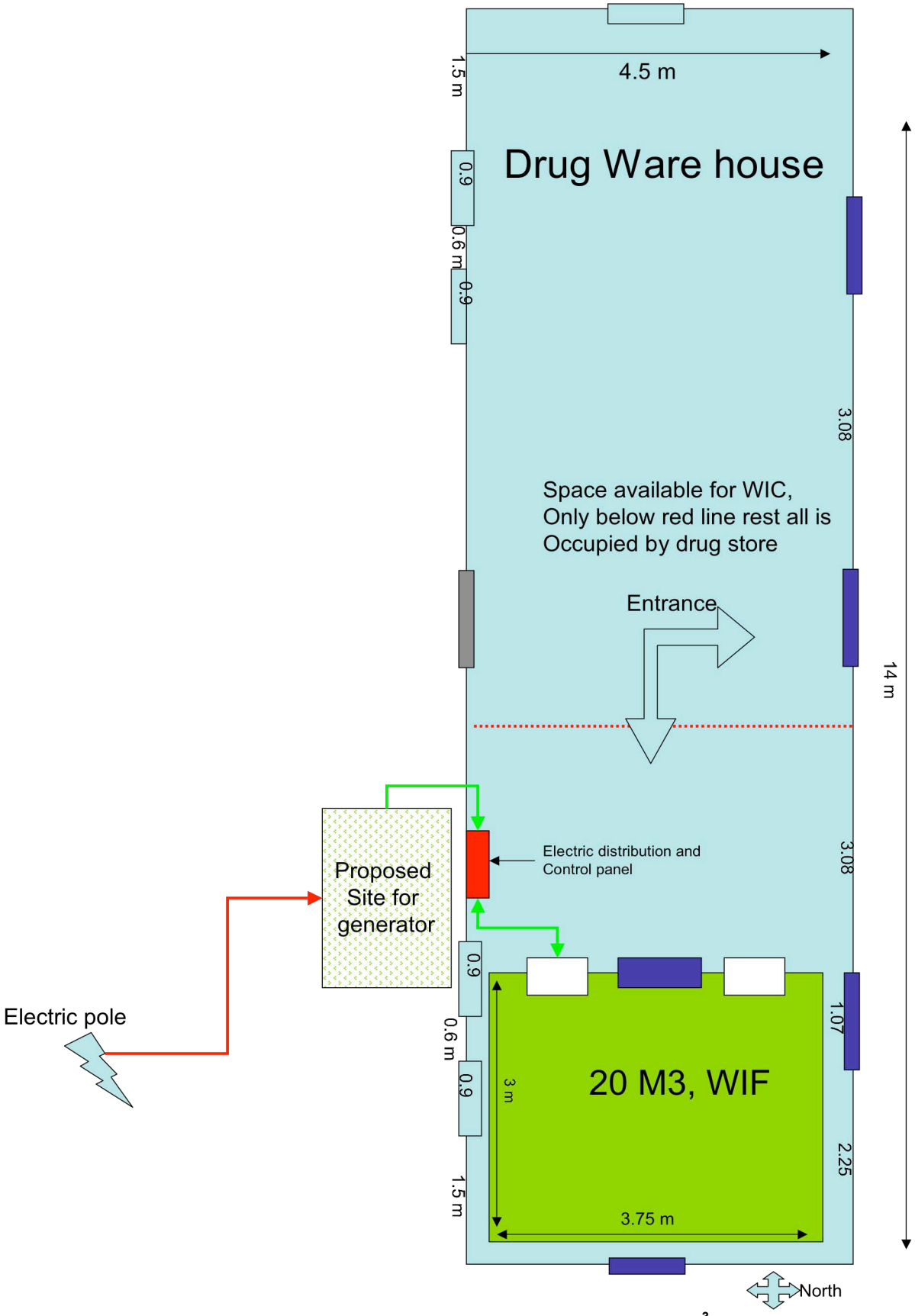


Figure20: Layout of site proposed for installation of 20 m^3, WIF

7.6. CUDDALORE, TAMIL NADU

SITE ASSESSMENT REPORT FOR INSTALLATION OF WIC IN CUDDALORE

TO

JOTHI RAMAJAYAM, ADMINISTRATION OFFICER

AT

DEPUTY DIRECTOR, HEALTH SERVICES,

BEACH ROAD, NEAR HIGH COURT, CUDDALORE, TAMIL NADU

SITE ASSESSMENT CARRIED ON 26 JUNE 2007

7.6.1. Background

UNICEF has designated IT Power India to inspect and install the walk-in cold rooms at 11 locations in India, which includes 4 Walk-in Freezers (WIF), 8 Walk-in-Coolers (WIC) and the replacement of 4 cooling units of 2 WIFs . With reference to the Special Service Agreement with UNICEF (number: SSA/INDQ/2007/00001015-0) following activities are to be performed by ITPI

1) Assist in identification and need assessment of suitable location at the proposed site selected by state government authorities/UNICEF
2) Installation of WIC/WIF at these proposed site as per guidelines provided in contract subject to:
3) All civil and electrical work at site completed by state government of respective sites.
4) All required material including WIC WIF parts are available on site (to be arranged by state government)

The evaluation parameters were evolved from The Guideline for Establishing or Improving Primary and Intermediate Vaccine Stores [(WHO/V&B 02.34) Version December 2002] and Equipment performance specifications and test procedures: Cold rooms and Freezer Rooms (WHO V&B 02.33).

Mr Ranjit Dhiman, Cold Chain Consultant, IT Power India visited the proposed sites for inspection.

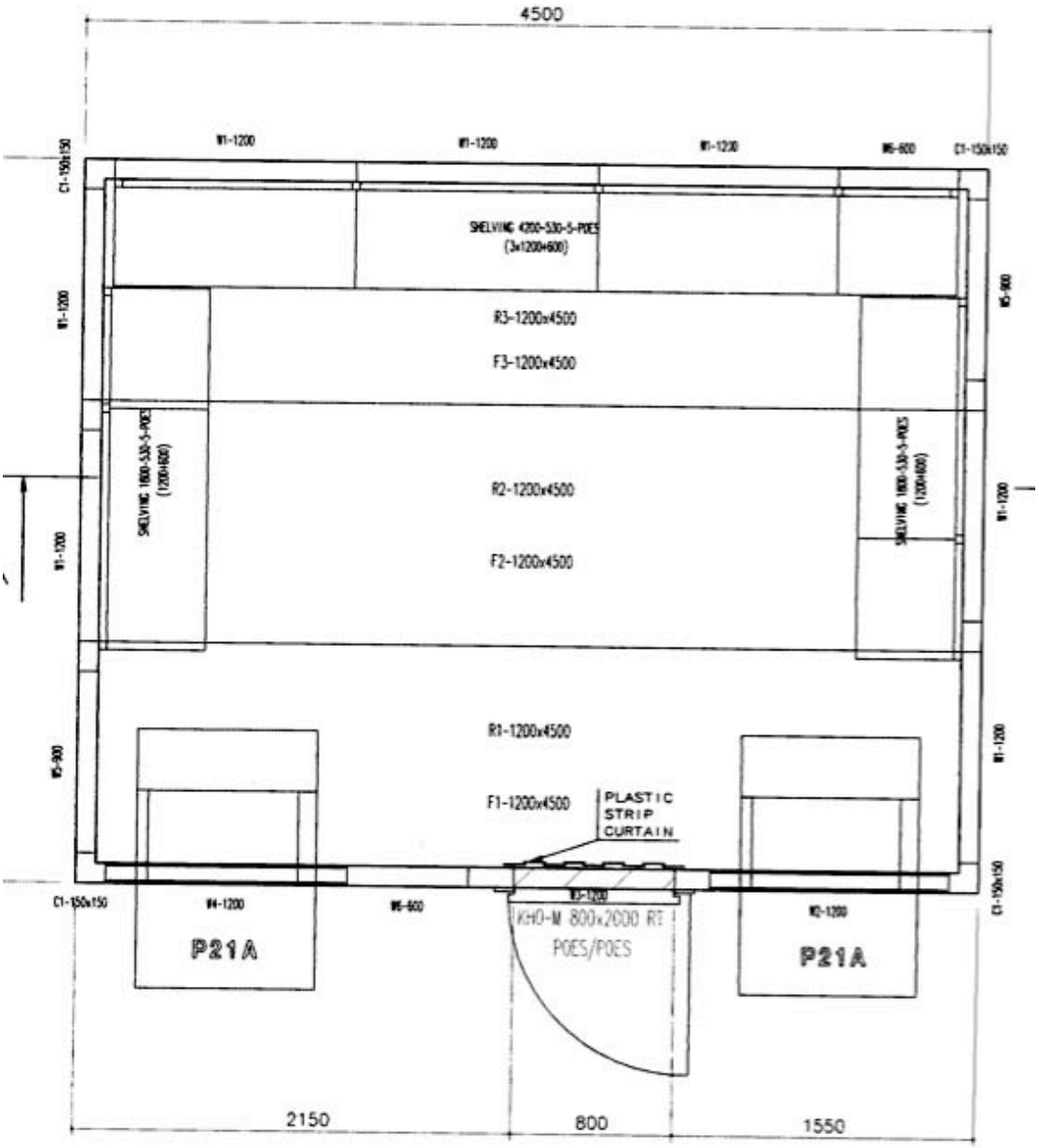
7.6.2. Specifications of cold room(s) to be installed

The site is due for installation of following cold room:

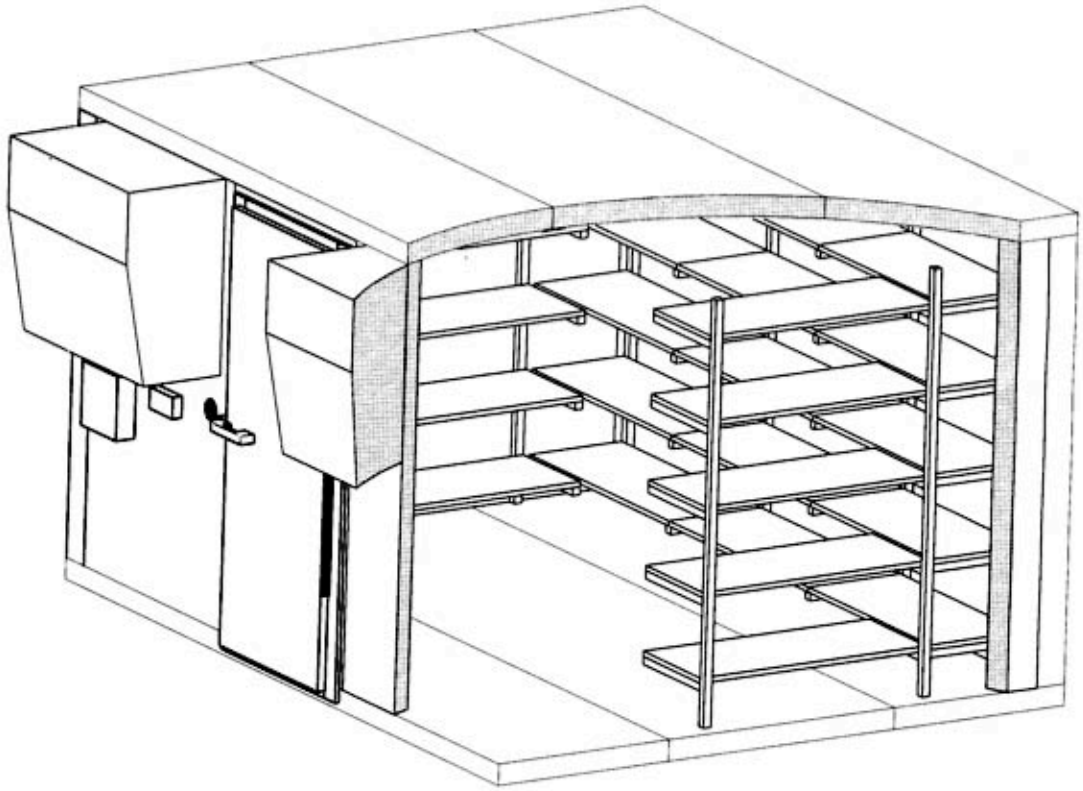
WIC of 30 Cubic Meter size, manufactured by HURREE.

7.6.3. Drawing of cold rooms

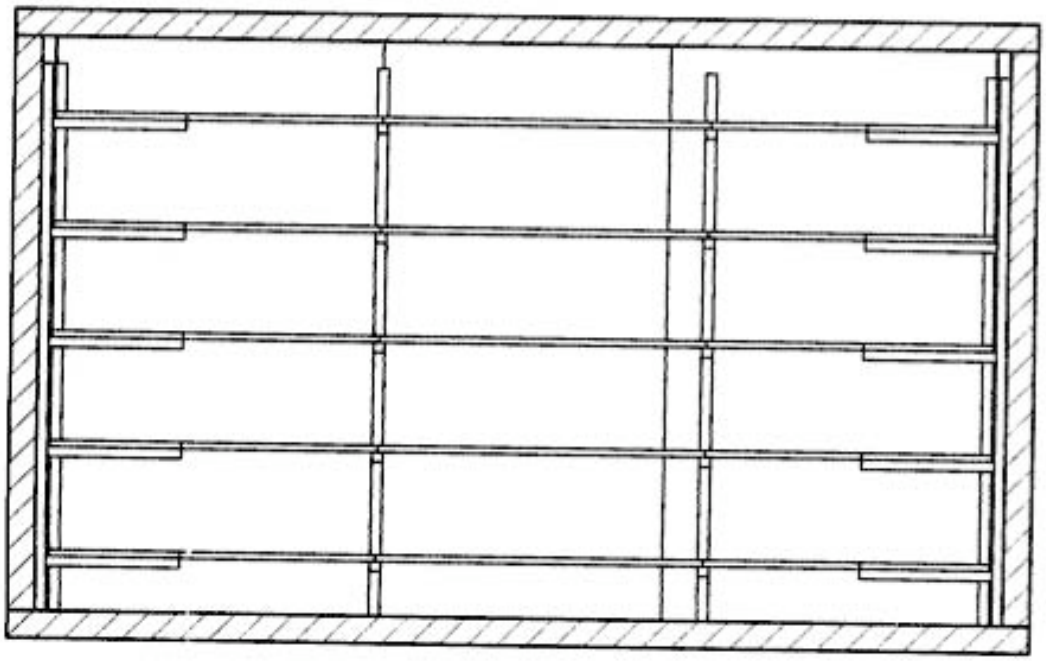
LAYOUT OF 30 M^3, WIC



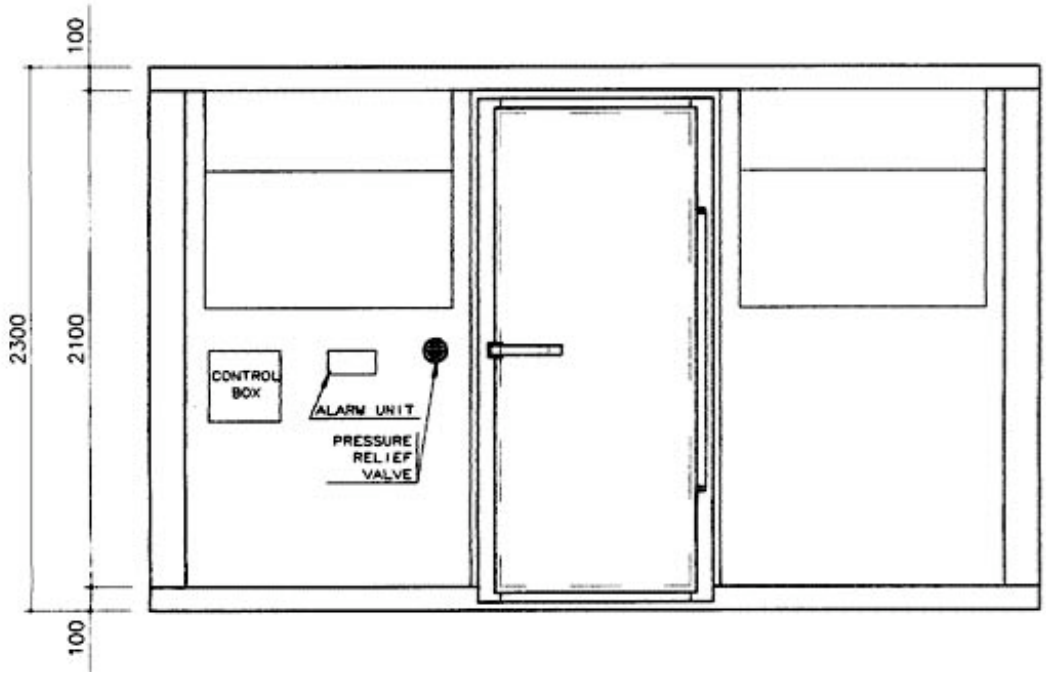
PLACEMENT OF SHELVES IN 30 M^3 WIC



SIDE VIEW OF SHELVES IN 30 M^3 WIC



FRONT VIEW OF WIC 30 M^3 SIZE



7.6.4. Observations

The proposed site is located in the premises of Deputy Director-Health Services, Beach road, Cuddalore. This site was proposed by the Administration Officer, Mr. Jothi Ramajayam.

See Figure 21 for a general layout of the Cuddalore proposed site for the WIC.

UNICEF has supplied new 30 m^3 WIC that will require an area of 4.5 m x 3.6 m. The size of the proposed location is 11.7 m x 7.05 m and is located in a newly constructed building.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The site has not received the WIC yet. However, it has received the 15 KVA generator and the Servo stabilizer.
2) The administrative officer proposed two sites, one of which is unsuitable for installing the new WIC due to its small in size, and the need to remove the partition present in the room to accommodate the cold room.
3) The second site is located on the ground floor of the newly constructed building. This construction is on-going but the finishing work is almost complete. This location was further assessed as it was considered more suitable for the cold room installation.
4) This proposed site has a large hall sufficient to host the WIC and move the existing ILRs and DFs to this location.
5) There is no dedicated power supply available at the location for WIC however the officers has suggested that they will extend the existing three-phase power supply from building less than 50 meters away.
6) There is no room for generator but a shed and lockable room can be constructed next to the hall.
7) The facility has an operational WIC (with metal walls), which is more than 25 years old. The WIC will be used as long as it is operational and there is no provision to replace it with a new one.

7.6.5. Site status

- ❑ Water supply and sanitary facilities

The building is of recent construction. There is a sink with a washing area and rest room next to the room.

- ❑ Drainage

The room is well drained with proper drainage system in place. The room has tiled flooring that facilitates floor washing.

- ❑ Lighting

The hall has 8 windows and 2 doors, which provide adequate natural lighting. The room is also equipped with tube lights at adequate distance from each other.

- ❑ Ventilation, heating and cooling

The room has 8 windows, 1.6 m X 1.25 m each. Air conditioning is required at vaccine packing area.

The location does not require any heating.

- ❑ Communications

The storekeeper's office in the proposed location requires a telephone connection. The store does not have data telecommunication line (internet). The telephone and telecommunications lines should be made available and kept separate so that the storekeeper's office line can eventually handle data transfer and the cold room lines can be linked to the temperature alarms and used for computerised monitoring.

- ❑ Security

The cold store facility is housed in a secured compound with guard services and the room is lockable. There is very little security threat with respect to theft or vandalism is considered very low; security risks with respect to fire can be reduced by the installation of four fire extinguishers in the hall.

- ❑ Vehicle access and loading convenience

Vehicles can directly access the proposed location. Currently, for the already operating store, packed vaccines are transported manually to the road adjacent to the store, from where they are loaded onto the vehicles. The passageway where the vaccine is loaded into the vaccine van is broad and adequate for vaccine loading.

- ❑ Security during loading

The site is not adequately secured for loading and unloading of vaccine from vaccine van as there is neither a loading bay nor a docking station. Vaccine is manually loaded and, cold boxes are often subject to damage during this process.

- ❑ Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of the building or loading point.

- ❑ Loading dock

There is a no loading dock but there is a scope of building one. A loading dock should be constructed next to the exit gate of the building where vaccine van can dock for easy loading and unloading of vaccine.

- ❑ Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and at the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

The size of the proposed storekeeper's office is approximately 3 m X 3 m and it has direct access to the new WIC. The furniture in the office should be arranged as shown in Figure 1, which requires a minimum area of 7.5 m^2. Records can be maintained and kept in this office.

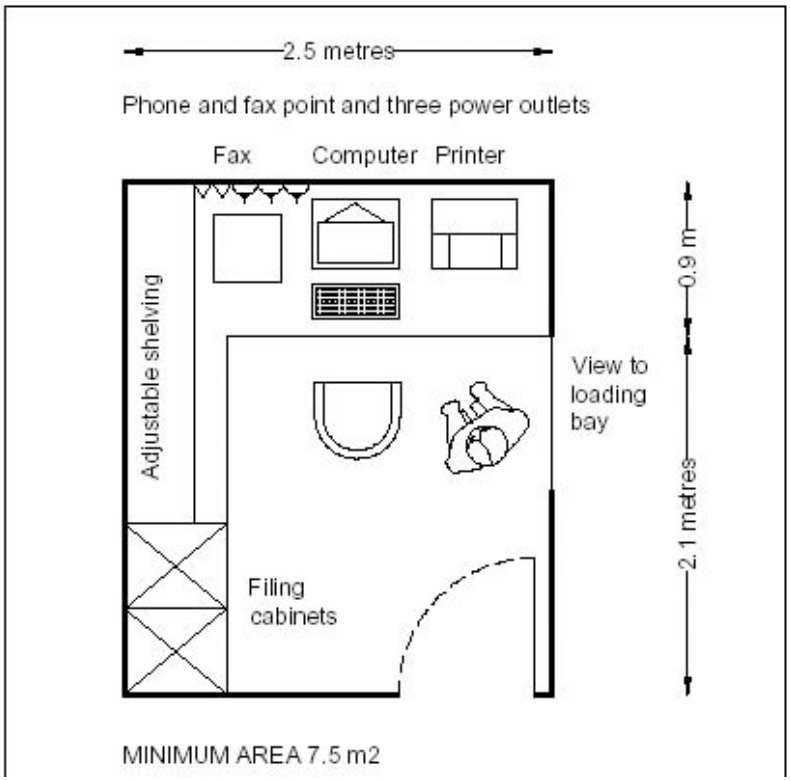
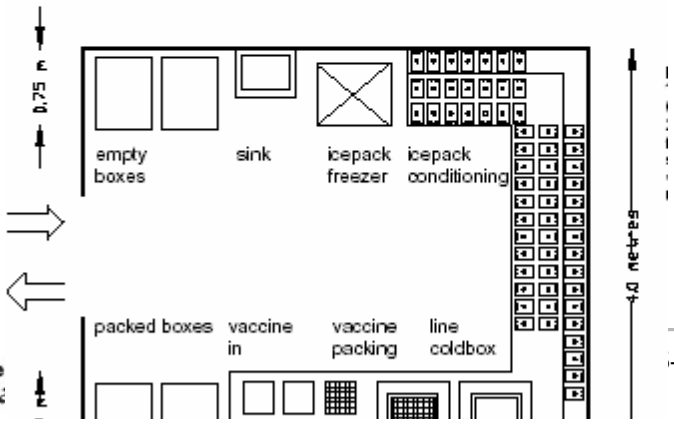


Figure 1: Proposed layout for storekeeper's office

- Packing area

With reference to Figure 2 an "L" shaped zone is available inside the hall for packing and unpacking of vaccine. This space is adequate for icepack conditioning and packing as per WHO-recommended norms. Utilization of this space will approximate that recommended in the WHO layout.

Figure 2: WHO recommended norms for icepack conditioning and packing of vaccine



- Proposed WIC

A space of 4.5 m x 3.6 m is required at the proposed location for assembling the 30 m^3 WIC. It should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness should be provided as a base for the WIC. Positioning of the WIC is indicated in Figure 21.

- Storage of consumables

There is no space available for storage of consumables at the proposed location. At this time, the consumables are stacked up in the office lobby, next to present vaccine store.

- Backup generator

There is a space available adjacent to the proposed location (open area) in which a shed can be constructed for the generator.

- Power situation and stability

The quality of the three-phase power supply from the national grid is reported to be adequate by administrative officer present on the site.

7.6.6. Recommendations linked to installation of cold room

1) A three-phase auto-start generator (supplied by UNICEF) should be installed to ensure backup power supply to the newly supplied WIC.

- Power distribution

2) A new three-phase 50 A electrical line should be drawn from the central power distribution panel of the building which is 50m away from proposed location. This line should be drawn directly to a metering and distribution panel mounted near the generator set.
3) A new three-phase distribution lines should be drawn from this distribution panel to the WIC. The panel should also be connected through an auto-start to the generator.
4) A reinforced concrete slab in the form of a raised plinth of 6 to 10 cm thickness should be pored at the location where the new WIC is to be installed. This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing. It is to be noted, however, that the floors seem to be washed rarely.
5) Complete the required electrical work, including a 3-phase dedicated power supply with a manual power cut-off switch for the cold room.

7.6.7. Recommendations as per guidelines, not linked to installation of cold room

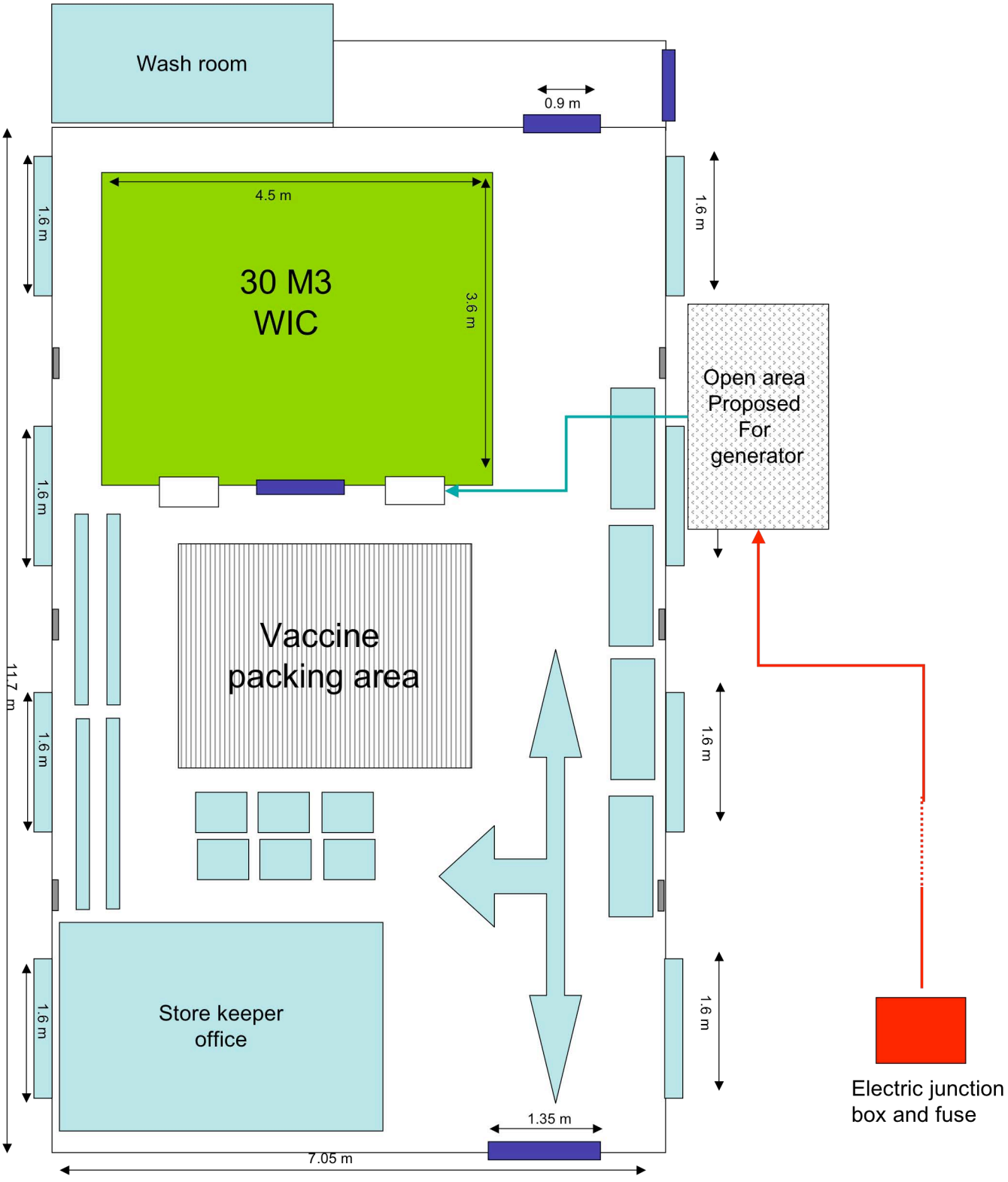
1) Install two telecommunication lines (data lines at the store keeper's desk).
2) Provide shelves in the storage room adjacent to the old WIC.
3) Furnish the storekeeper's office and include a lockable cabinet for record keeping.
4) Minimise risk of fire by installing fire extinguishers in the proposed room.
5) Install smoke detectors and sprinklers in the vaccine storage areas.
6) Build a hanger along the front of the building. The hanger should not impair the passage of hot air from the ventilation apertures.
7) Install two water-resistant electrical sockets on the wall under the hanger.
8) Install a 10-ton air conditioning system at the proposed location.
9) Install benches for icepack conditioning and vaccine packaging.
10) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

7.6.8. Conclusion

The newly constructed room is ideal for a cold store facility. But there is no space for the storage of consumables. The recommended standards as per the WHO guidelines can be implemented if the entire room is made available to the store. The site will be ready for installation of WIC upon completion of the electrical connections and minor civil work.

7.6.9. Drawing of site proposed

Figure21: Proposed layout for store room of Cuddalore and position of WIC



7.7. BOLANGIR, ORISSA

SITE ASSESSMENT REPORT FOR INSTALLATION OF WIC IN BOLANGIR

TO

DR. SHARAD CHANDRA MISHRA, CHIEF MEDICAL OFFICER

SURESH CHANDRA JENA, STATE COLD CHAIN OFFICER

HIMANSHU RANJAN KAR, DISTRICT PROGRAM MANAGER

AT

LEPROSY BUILDING,
NEAR WAREHOUSE (MEDICAL STORE)
BOLANGIR, ORISSA

SITE ASSESSMENT CARRIED ON 28 JUNE 2007

7.7.1. Background

UNICEF has designated IT Power India to inspect and install the walk-in cold rooms at 11 locations in India, which includes 4 Walk-in Freezers (WIF), 8 Walk-in-Coolers (WIC) and the replacement of 4 cooling units of 2 WIFs . With reference to the Special Service Agreement with UNICEF (number: SSA/INDQ/2007/00001015-0) following activities are to be performed by ITPI

1) Assist in identification and need assessment of suitable location at the proposed site selected by state government authorities/UNICEF
2) Installation of WIC/WIF at these proposed site as per guidelines provided in contract subject to:
3) All civil and electrical work at site completed by state government of respective sites.
4) All required material including WIC WIF parts are available on site (to be arranged by state government)

The evaluation parameters were evolved from The Guideline for Establishing or Improving Primary and Intermediate Vaccine Stores [(WHO/V&B 02.34) Version December 2002] and Equipment performance specifications and test procedures: Cold rooms and Freezer Rooms (WHO V&B 02.33).

Mr Ranjit Dhiman, Cold Chain Consultant, IT Power India visited the proposed sites for inspection.

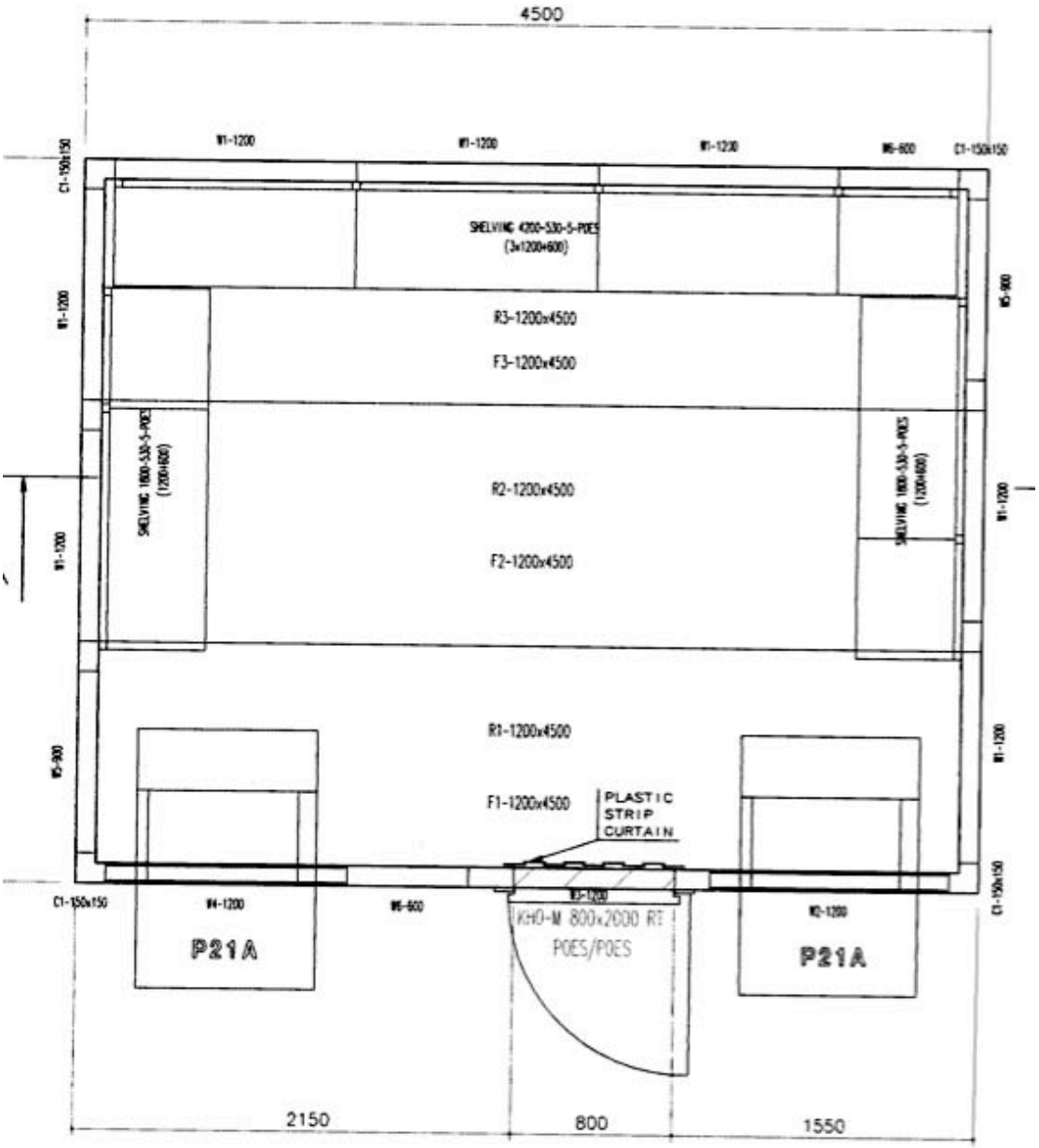
7.7.2. Specifications of cold room(s) to be installed

The site is due for installation of following cold room:

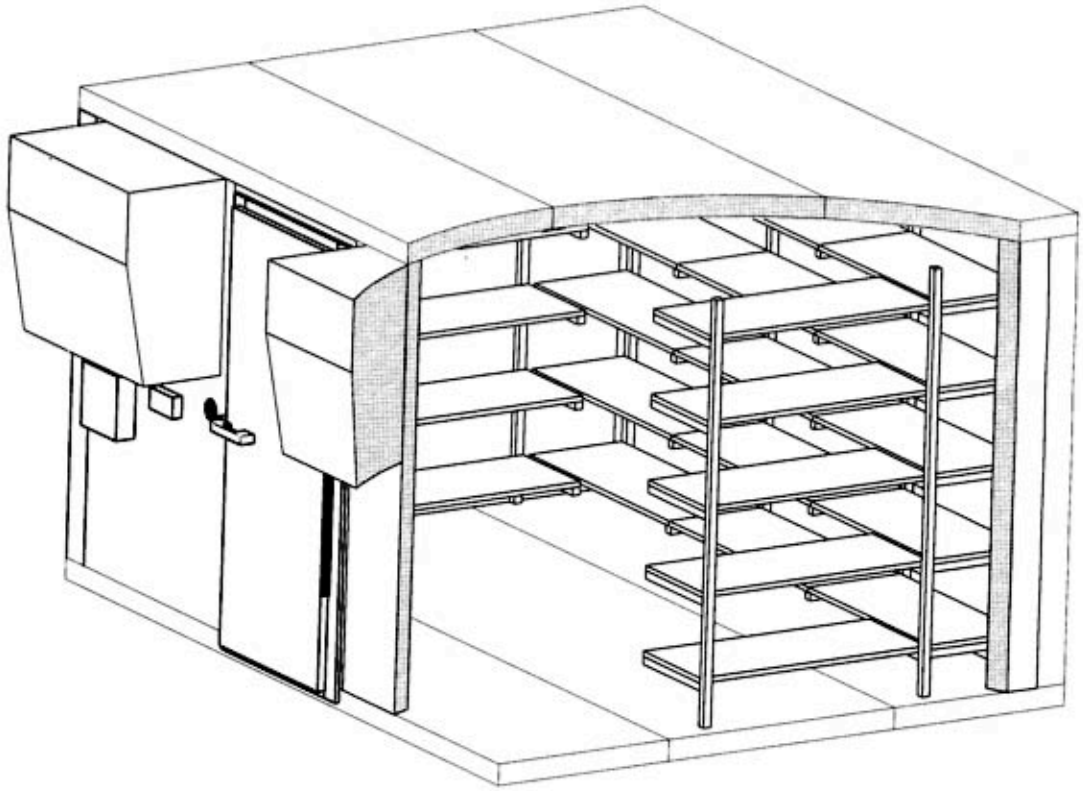
WIC of 30 Cubic Meter size, manufactured by HURREE.

7.7.3. Drawing of cold rooms

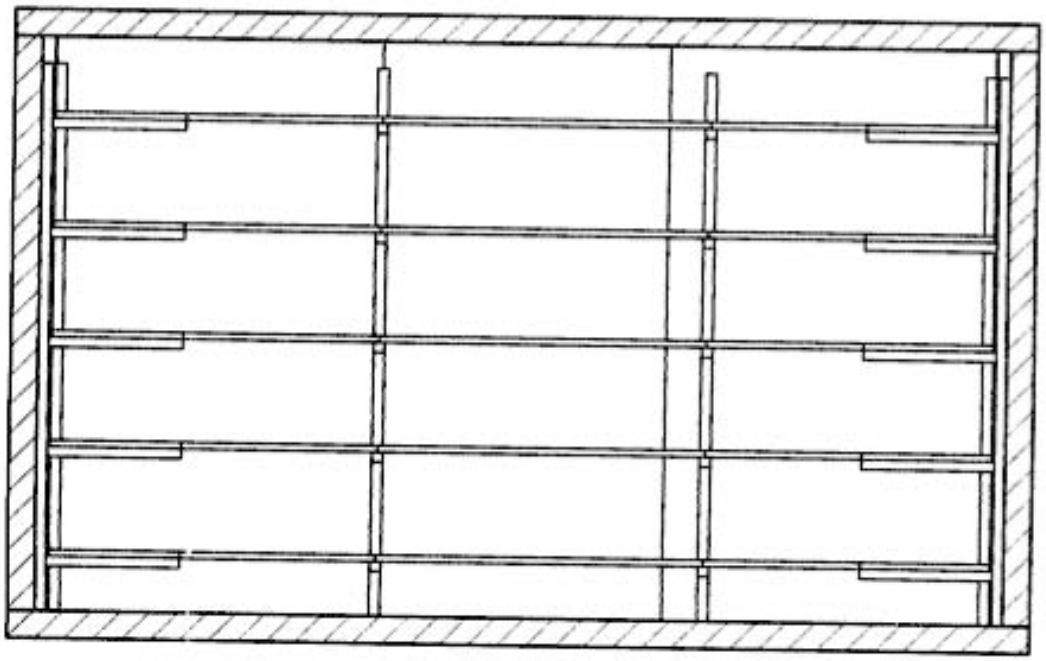
LAYOUT OF 30 M^3, WIC



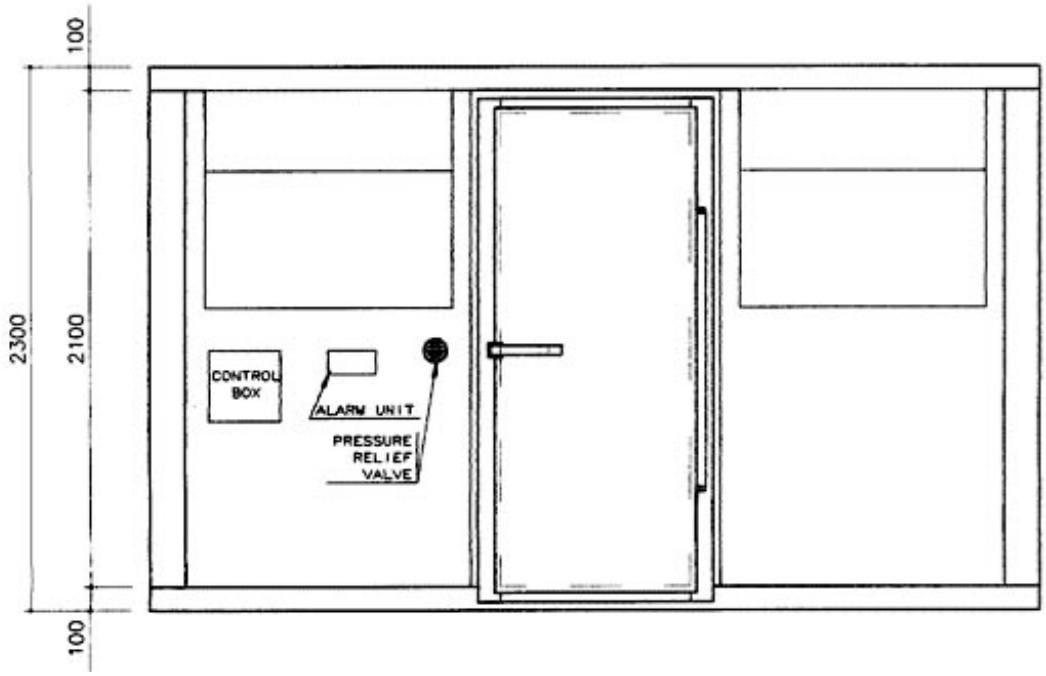
PLACEMENT OF SHELVES IN 30 M^3 WIC



SIDE VIEW OF SHELVES IN 30 M^3 WIC



FRONT VIEW OF WIC 30 M^3 SIZE



7.7.4. Observations

The proposed site is located in the premises of Leprosy building, near warehouse (medical store), Bolangir. The proposed location for the installation of a 30 m^3 WIC is in a old constructed building. The site was proposed by the CMO as the most feasible and immediately available option.

See Figure 22 for a general layout of the Bolangir proposed site.

UNICEF has supplied new 30 m^3 WIC which will require an area of 4.5 m x 3.6 m. The size of proposed location is 11.1m x 5.3 m.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The site has received the WIC. The unpacked unit is stored in a secure place in the general hospital premises.
2) The site has also received the stabilizer and the generator.
3) The authorities have proposed two rooms for the installation of the WIC. The first room is very small and filled with stock. The staff does not see it as an option and suggest installation of the WIC at the second location.
4) The second room is in the Leprosy building. The entire wing of the single-floor building is vacant. There is a large hall in the proposed location which is sufficient to install WIC and host the ILR's and DF's which are currently installed in a damp and old, fragile building. Since this site was found to be more suitable, it was further assessed.
5) The CMO has applied for a new three-phase electrical connection, which can be provided at either of the proposed locations.
6) In terms of civil work, the second site requires minimum work except for the cleaning and repainting of walls and repairing of the main entrance gate. This site also has a room for the generator and for storing spare parts and fuel.
7) Refer to Figure 22 for proposed layout for vaccine store and placement of the WIC.

7.7.5. Site status

- ❑ Water supply and sanitary facilities

There is adequate water supply at the proposed location. A sink is available for washing/cleaning with a provision to evacuate water into an pit-hole drainage system. However there is no provision for draining away water from the floor in the hall of flooding or when the floors are cleaned.

The building is poorly maintained as the facility has been out of use for a long time. The space required to be substantially cleaned up to convert the facility into the vaccine store.

- ❑ Drainage

The building is well drained considering that this is an old construction. The floor is elevated by about 30 cm from ground level.

Constructing a raised plinth on which the WIC can be mounted will prevent eventual corrosion and provide a safeguard against possible flooding. Plinth construction would require the assessment of the floor loading capacity.

- ❑ Lighting

The proposed location has large windows that provide adequate lighting. There is no exposure to direct sunlight at the packing area.

- ❑ Ventilation, heating and cooling

The proposed room has a ceiling height of more than 3 m. It is well ventilated, with 8 large windows of 1.1 m width each. The site requires extractor fans to ventilate the large hall. The vaccine packing area needs to be air-conditioned.

The location does not require any heating.

- ❑ Communications

The storekeeper's office is currently located in the general hospital, about 100m away from the present vaccine store. The office should be relocated to cold-room installation site. Separate telephone and telecommunications lines should be made available so that the storekeeper's office line can eventually handle data transfer, and the cold room lines can be linked to the temperature alarms and used for computerized monitoring.

- ❑ Security

The proposed cold store location is housed in a walled compound with no guard services at present. The room is lockable, though the grilled gate requires repair. There is no great security threat with respect to theft or vandalism; however, security risk with respect to fire is high as there are no fire extinguishers installed in the hall.

The present vaccine store is located in a building with open access. The security threat with respect to theft is considered very high.

- ❑ Vehicle access and loading convenience

Vehicles can directly access proposed Location. The site is connected to a broad road.

- ❑ Security during loading

The site is not adequately secured for loading and unloading of vaccine from vaccine van as there is no loading bay or docking station.

- ❑ Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of building or loading point.

- ❑ Loading dock

There is a no loading dock but there is a scope of building one. The loading dock should be constructed next to the exit gate of the building, where the vaccine van can dock for easy loading and unloading of vaccine.

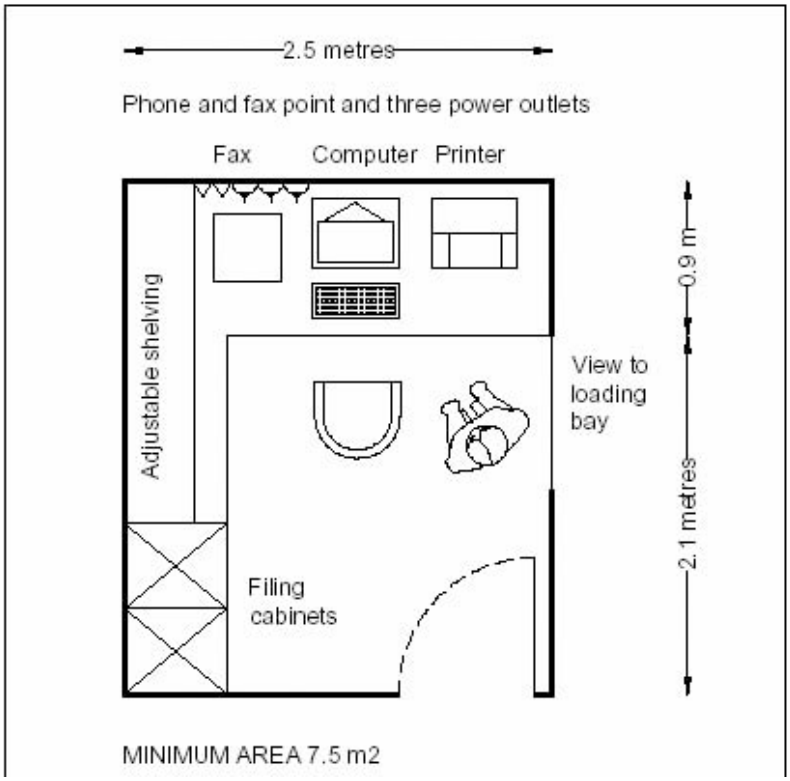
- Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and at the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

The size of the proposed storekeeper's office is approximately 4 m X 3.5m and it has direct access to the proposed WIC location. The furniture in the office should be arranged as shown in Figure 1, which requires a minimum area of 7.5 m^2. Records can be maintained and kept in this office.

Figure 1: Proposed layout for storekeeper's office



- Packing area

With reference to Figure 2 an "L" shaped zone is available inside the hall for packing and unpacking of vaccine. This space is adequate for icepack conditioning and packing as per WHO-recommended norms. Utilization of this space will approximate the criterion outlined in the WHO layout.

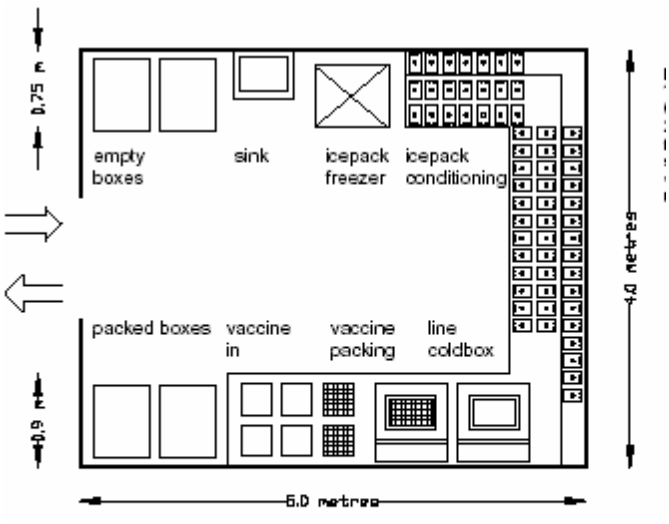


Figure 2: WHO recommended norms for icepack conditioning and packing of vaccine

- Proposed WIC

A space of 4.5 m x 3.6 m has been assigned at the proposed location for assembling the 30 m^3 WIC. It should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness has to be poured to provide a base for the WIC. Positioning of the WIC is indicated in Figure 22.

- Storage of consumables

A small space of about 2 m x 2.5 m is available immediately adjacent to the proposed storekeeper's office. This requires storage shelving and is adequate for storage of diluents and immunization-related consumables.

There are two more additional rooms available at the facility, which can be used as a storeroom for consumables.

- Backup generator

A separate room located close to the proposed site of the WIC is available to mount a generator. This requires electrical wiring from the generator room to the proposed location of WIC. Refer to Figure 22 for details.

- Power situation and stability

The cold chain officer at the site has confirmed that the quality of the three-phase power supply from the national grid is adequate.

A new 15 KVA generator has been supplied to the site and is to be installed. This generator will be adequate to power the cold room in the event of power cuts.

7.7.6. Recommendations linked to installation of cold room

1) Install a three-phase auto-start generator (supplied by UNICEF) to ensure backup to existing ILR's and DF's and the newly supplied WIC.
2) A new three-phase 50 A electrical line should be drawn from the electrical transformer 200 meters away from the proposed site to panel of the building. This line should be drawn directly to a metering and distribution panel mounted near the generator set.
3) New three-phase distribution lines should be drawn from this distribution panel to WIC. The panel should also be connected through an auto-start to the generator.
4) The electrical supply, distribution panels and circuit protection arrangement for all the electrical apertures in the room should be rewired
5) A reinforced concrete slab, in the form of a raised plinth of 6 cm to 10 cm thickness should be poured at the location where the new WIC is to be installed. This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing. It is to be noted, however, that the floors seem to be washed rarely.
6) All the electrical work, including drawing of a 3-phase dedicated power supply line with a manual power cut-off switch for the cold room needs to be completed.
7) The proposed premises need to be cleaned and the walls whitewashed. The electrical connections and wiring in the room need improvement.

7.7.7. Recommendations as per guidelines, not linked to installation of cold room

1) Install two telecommunication lines (data lines at the store keeper's desk).
2) Provide shelves in the storage room for consumables.
3) Furnish the storekeeper's office and include a lockable cabinet for record keeping.
4) Minimise risk of fire by:

- Removal of unused inflammable materials from the premises.
- Improvement of electrical cabling for existing installations and fault-detection devices (contact breakers)
- Installation of fire extinguishers at the proposed site

5) Install smoke detectors and sprinklers in the vaccine storage areas.
6) Build a hanger along the front of the building. The hanger should not impair the passage of hot air from the ventilation apertures.

7) Install two water-resistant electrical sockets on the wall under the hanger
8) Install benches for icepack conditioning and packaging.
9) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

7.7.8. Conclusion

The proposed site is of adequate size to host the vaccine store. But it requires substantial cleaning and refurbishment prior to installation. The proposed site is a better option as compared to the existing facility. The site is ready for installation of the cold room subject to completion of the electrical and civil work recommended above.

7.7.9. Drawing of site proposed

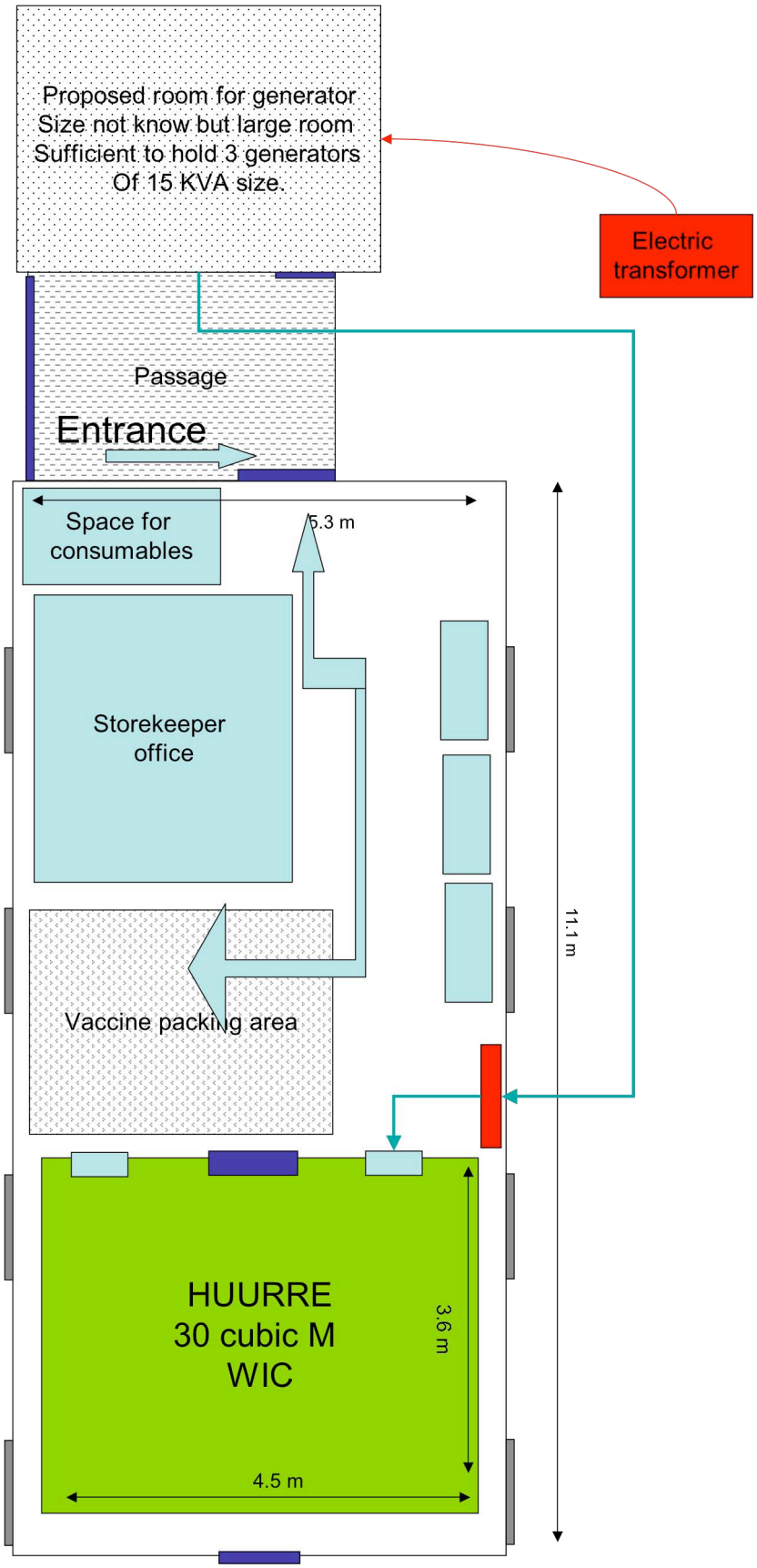


Figure22: Proposed layout for Bolangir vaccine store and placement of 30 M3 WIC

7.8. JABALPUR, MADHYA PRADESH

SITE ASSESSMENT REPORT FOR INSTALLATION OF WIC IN JABALPUR

TO

DR KAUSHLESH SHUKLA, JOINT DIRECTOR

DR. SHAFADULLAH KHAR, (DEPUTY DIRECTOR, FW.

AT

OFFICE OF REGIONAL DIRECTOR,
NEAR INDIRA MARKET, RAILWAY STATION LINE,
JABALPUR, MADHYA PRADESH

SITE ASSESSMENT CARRIED ON 30 JUNE 2007

7.8.1. Background

UNICEF has designated IT Power India to inspect and install the walk-in cold rooms at 11 locations in India, which includes 4 Walk-in Freezers (WIF), 8 Walk-in-Coolers (WIC) and the replacement of 4 cooling units of 2 WIFs . With reference to the Special Service Agreement with UNICEF (number: SSA/INDQ/2007/00001015-0) following activities are to be performed by ITPI

1) Assist in identification and need assessment of suitable location at the proposed site selected by state government authorities/UNICEF
2) Installation of WIC/WIF at these proposed site as per guidelines provided in contract subject to:
3) All civil and electrical work at site completed by state government of respective sites.
4) All required material including WIC WIF parts are available on site (to be arranged by state government)

The evaluation parameters were evolved from The Guideline for Establishing or Improving Primary and Intermediate Vaccine Stores [(WHO/V&B 02.34) Version December 2002] and Equipment performance specifications and test procedures: Cold rooms and Freezer Rooms (WHO V&B 02.33).

Mr Ranjit Dhiman, Cold Chain Consultant, IT Power India visited the proposed sites for inspection.

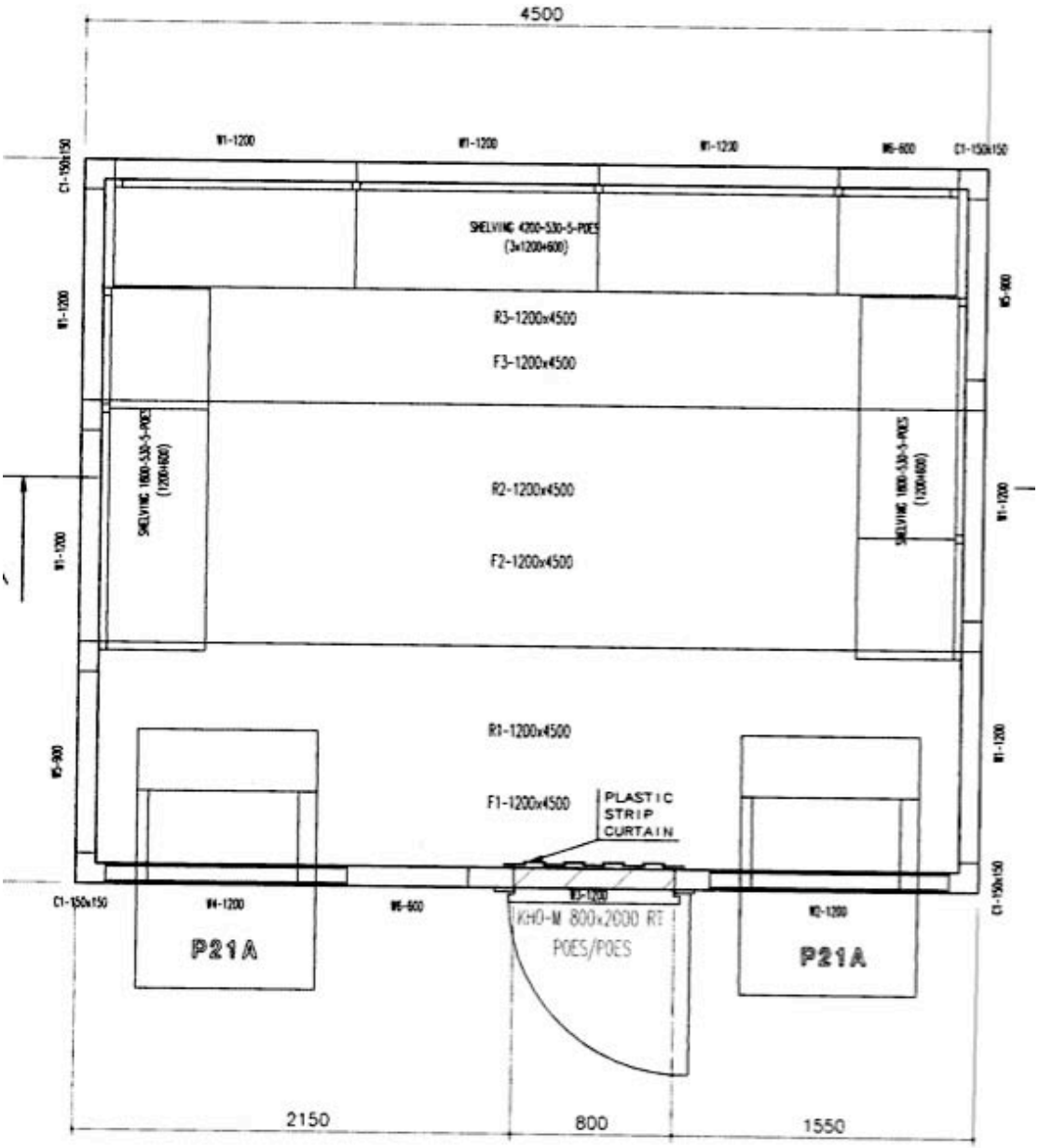
7.8.2. Specifications of cold room(s) to be installed

The site is due for installation of following cold room:

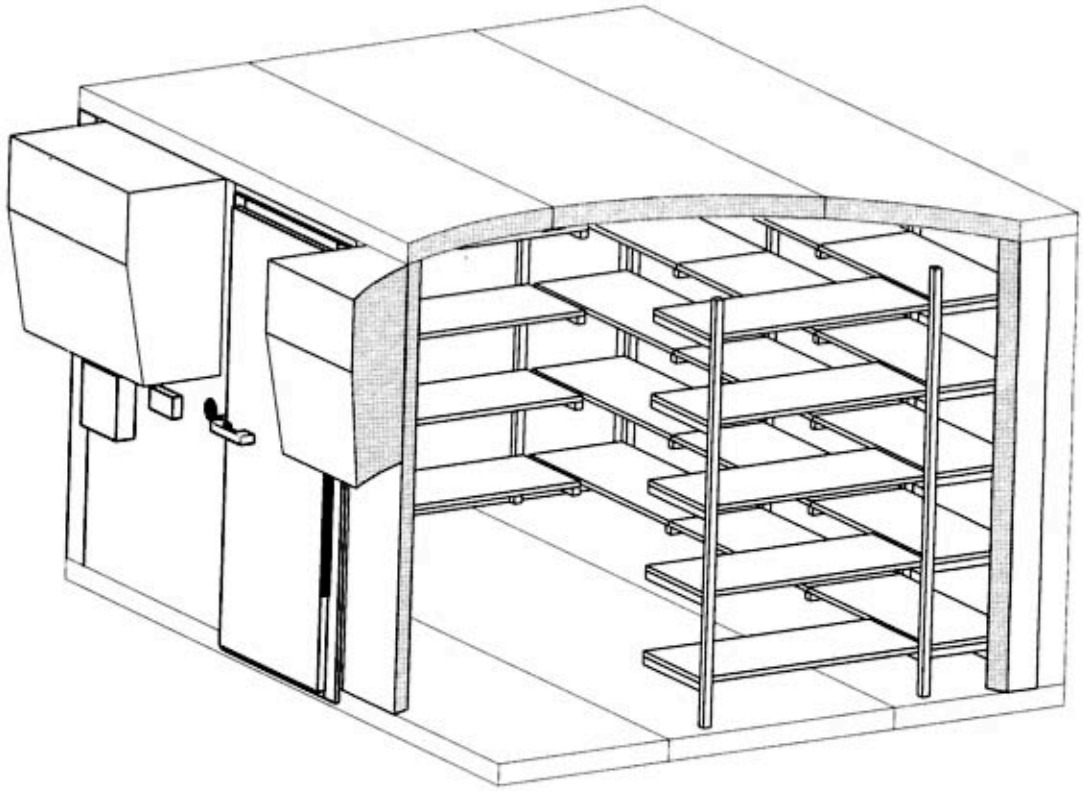
WIC of 30 Cubic Meter size, manufactured by HURREE.

7.8.3. Drawing of cold rooms

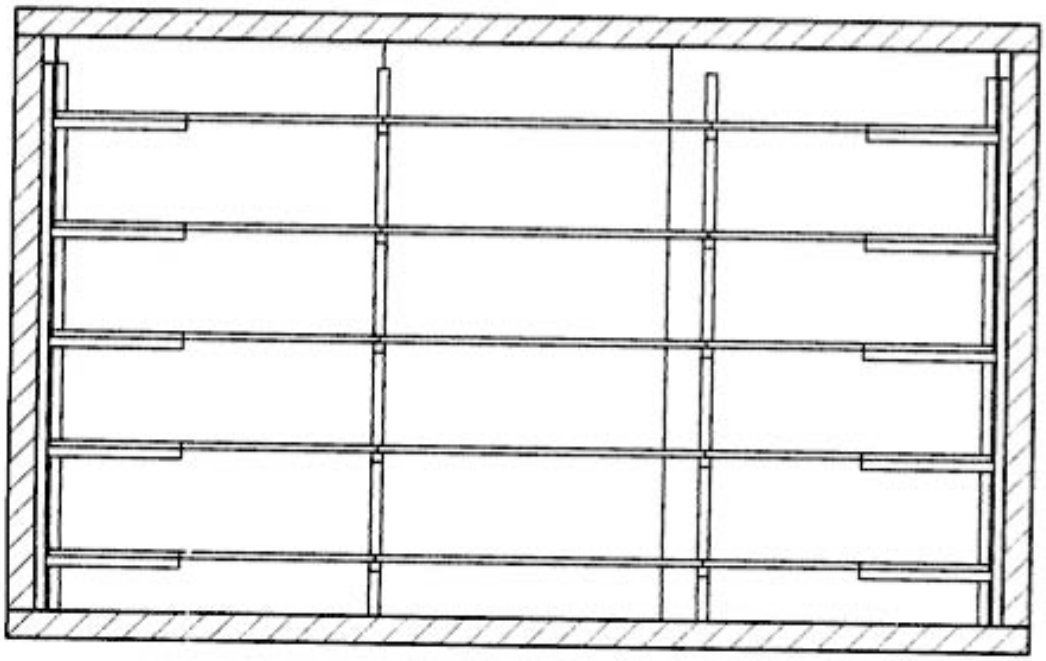
LAYOUT OF 30 M^3, WIC



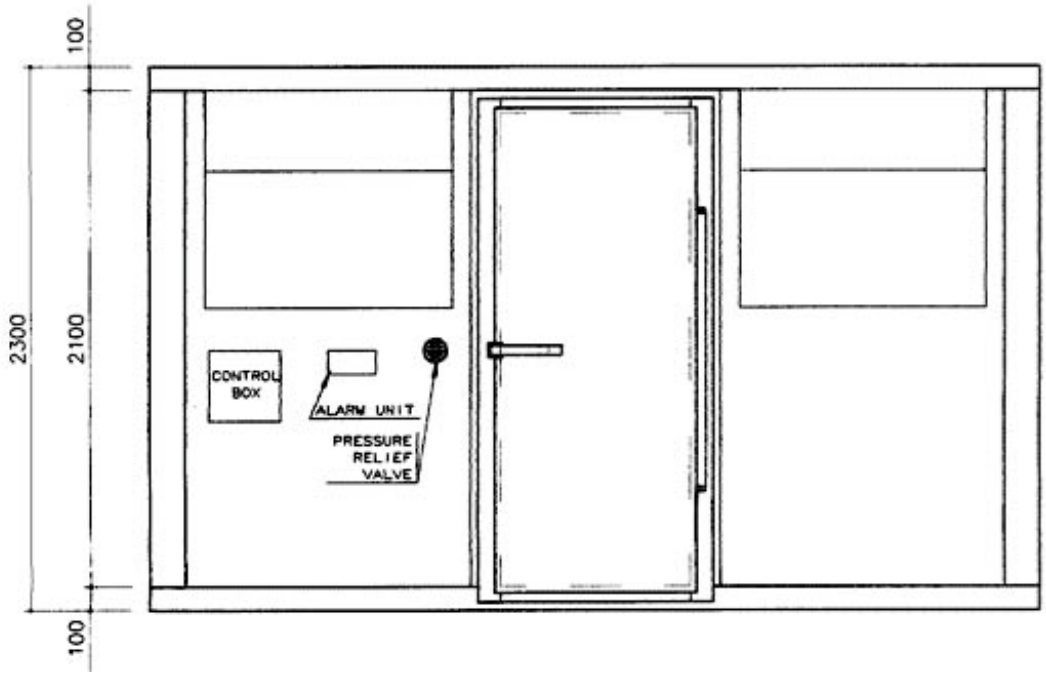
PLACEMENT OF SHELVES IN 30 M^3 WIC



SIDE VIEW OF SHELVES IN 30 M^3 WIC



FRONT VIEW OF WIC 30 M^3 SIZE



7.8.4. Observations

The proposed site is located in the premises as the office of the Deputy Director, State Health and Family Welfare, Near Indira Market, Railway station line, Jabalpur. This location was proposed by the Joint Director as most feasible and immediately available option.

UNICEF has scheduled to install a 30 m^3, WIC, HUURRE at this site which will require an area of 4.5 m x 3.6 m. The size of proposed location is 7 m x 5.5 m. It is an open area adjacent to the state cold chain workshop, and a room needs to be constructed to house the WIC.

See Figure 23 for a general layout of the Jabalpur proposed site for WIC.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The site has not received the WIC yet, however it has received the servo stabiliser and 15 KVA generator.
2) A room needs to be constructed at the proposed location as presently the site is an empty plot located next to the cold chain workshop.
3) Another option suggested was the construction of a multi-storey building at another location. A proposal has been submitted by the Joint Director to the Bhopal Family Welfare Director, which includes the architectural plan of the building. This site is intended to house the WIC, but since the entire process might take almost 2 years for completion, it is not the preferred option.
4) There is an existing WIC, which is installed at St Govind Das District hospital (also knows as Victoria Hospital). This hospital hosts the regional and district stores. The proposed site, which is in the premises of Joint Director, will host the regional vaccine store and the district vaccine store continues to operate from Victoria hospital.
5) According to Dr. Shafadullah, a separate connection from the transformer may not be a feasible option. Since the building already has a three-phase connection, it could be extended to the WIC when the site is ready for installation.
6) There is inadequate space for storage of consumables. A space will also be available in the proposed new two-storey building.

7.8.5. Recommendations linked to installation of cold room

1) A room should be constructed for both the WIC and the generator as per the layout suggested in Figure and as per the recommended electrical and civil work outlined below.
2) A three-phase auto-start generator (supplied by UNICEF) needs to be installed to ensure power backup to the new WIC.
3) A new three-phase 50 A electrical line should be drawn from the central power distribution panel of the building. This line should be

drawn directly to a metering and distribution panel mounted near the generator set.

4) A new three-phase distribution lines should be drawn from this distribution panel WIC. The panel should also be connected through an auto-start to the generator.
5) The electrical supply, distribution panels and circuit protection arrangement for all the cold room installations should be rewired, with the appropriate connection to the auto-start generator set.
6) A reinforced concrete slab should be poured in the form of a raised plinth of 6 cm to 10 cm thickness at the location where the new WIC is to be installed. This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing.
7) The electrical work, including drawing of a dedicated three-phase power supply with a manual power cut-off switch for the cold room needs to be completed.

7.8.6. Recommendations as per guidelines, not linked to installation of cold room

1) Install two telecommunication lines (data lines at the store keeper's desk).
2) Provide shelves in the allotted storage room.
3) Furnish the storekeeper's office and include a secure lockable cabinet for recordkeeping.
4) Minimise risk of fire by installing fire extinguishers at the proposed location.
5) Install smoke detectors and sprinklers in the vaccine storage areas.
6) Build a hanger, which should not impair the passage of hot air from the ventilation apertures.
7) Install two water-resistant electrical sockets on the wall under the hanger.
8) Install a washing/cleansing water supply system linked to a drainage facility.
9) Install benches for icepack conditioning and packaging.
10) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance for the WIC and the generator, and also to ensure prompt response and quality maintenance services for unscheduled equipment failures.

7.8.7. Conclusion

The site is not ready for installation of the WIC as it does not have a room to host the WIC. Construction work needs to be undertaken, which might take anywhere between 3 to 6 months, subject to availability of resources. Since the plan is to construct a new room, it is strongly recommended that it be built to the required standards.

7.8.8. Drawing of site proposed

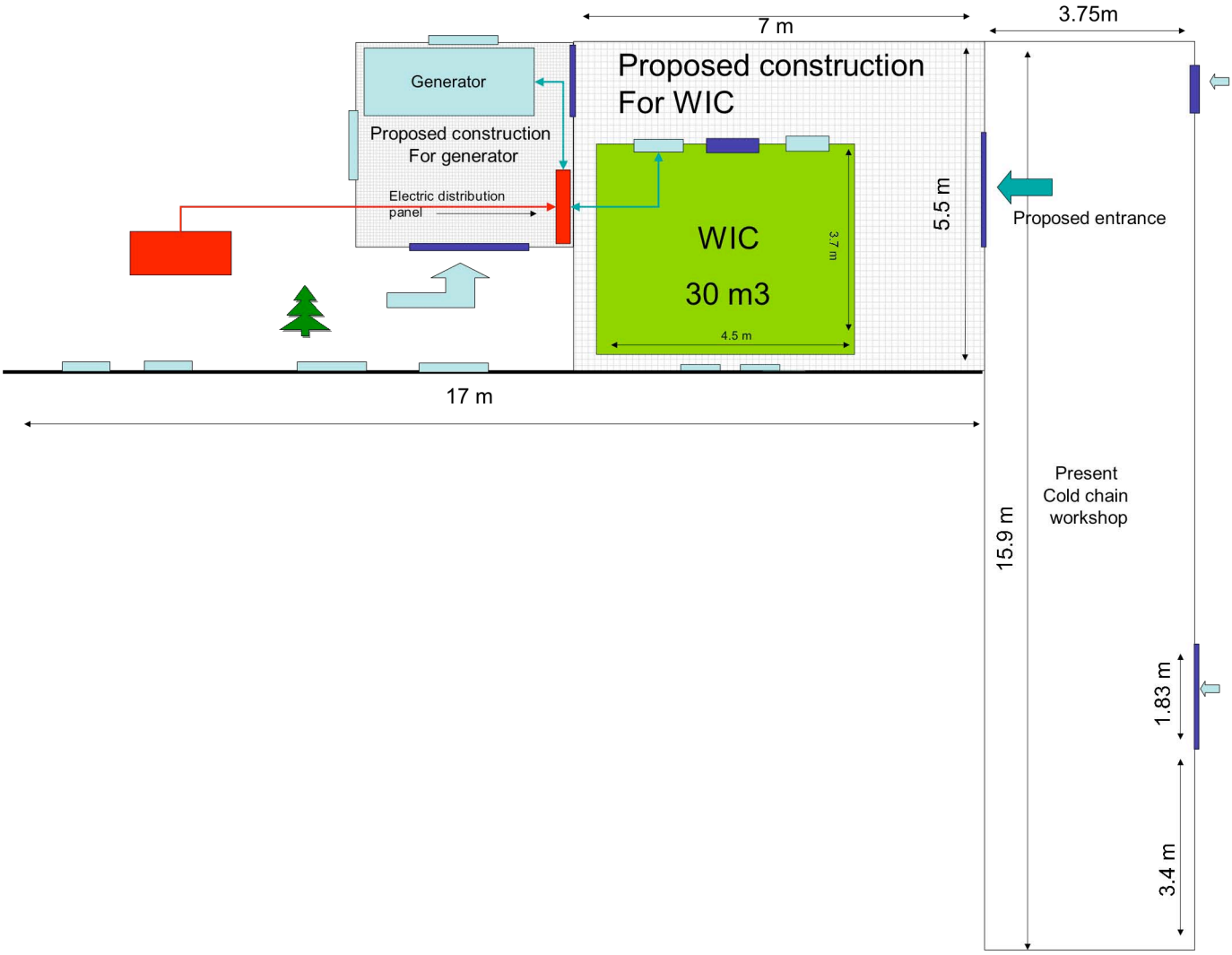


Figure23: proposed construction of room and placement of WIC

7.9. ALLAHABAD, UTTAR PRADESH

SITE ASSESSMENT REPORT FOR INSTALLATION OF WIC IN ALLAHABAD

TO

DR G C SHRIVASTAVA, ADDITIONAL DIRECTOR

HARISH CHANDRA, REFRIGERATION MECHANIC

ANJALI PANDEY, STORE INCHARGE

AT

MOTILAL NEHRU DISTRICT HOSPITAL, OPD WARD, ALLAHABAD, UTTAR PRADESH

SITE ASSESSMENT CARRIED ON 3 JULY 2007

7.9.1. Background

UNICEF has designated IT Power India to inspect and install the walk-in cold rooms at 11 locations in India, which includes 4 Walk-in Freezers (WIF), 8 Walk-in-Coolers (WIC) and the replacement of 4 cooling units of 2 WIFs . With reference to the Special Service Agreement with UNICEF (number: SSA/INDQ/2007/00001015-0) following activities are to be performed by ITPI

1) Assist in identification and need assessment of suitable location at the proposed site selected by state government authorities/UNICEF
2) Installation of WIC/WIF at these proposed site as per guidelines provided in contract subject to:
3) All civil and electrical work at site completed by state government of respective sites.
4) All required material including WIC WIF parts are available on site (to be arranged by state government)

The evaluation parameters were evolved from The Guideline for Establishing or Improving Primary and Intermediate Vaccine Stores [(WHO/V&B 02.34) Version December 2002] and Equipment performance specifications and test procedures: Cold rooms and Freezer Rooms (WHO V&B 02.33).

Mr Ranjit Dhiman, Cold Chain Consultant, IT Power India visited the proposed sites for inspection.

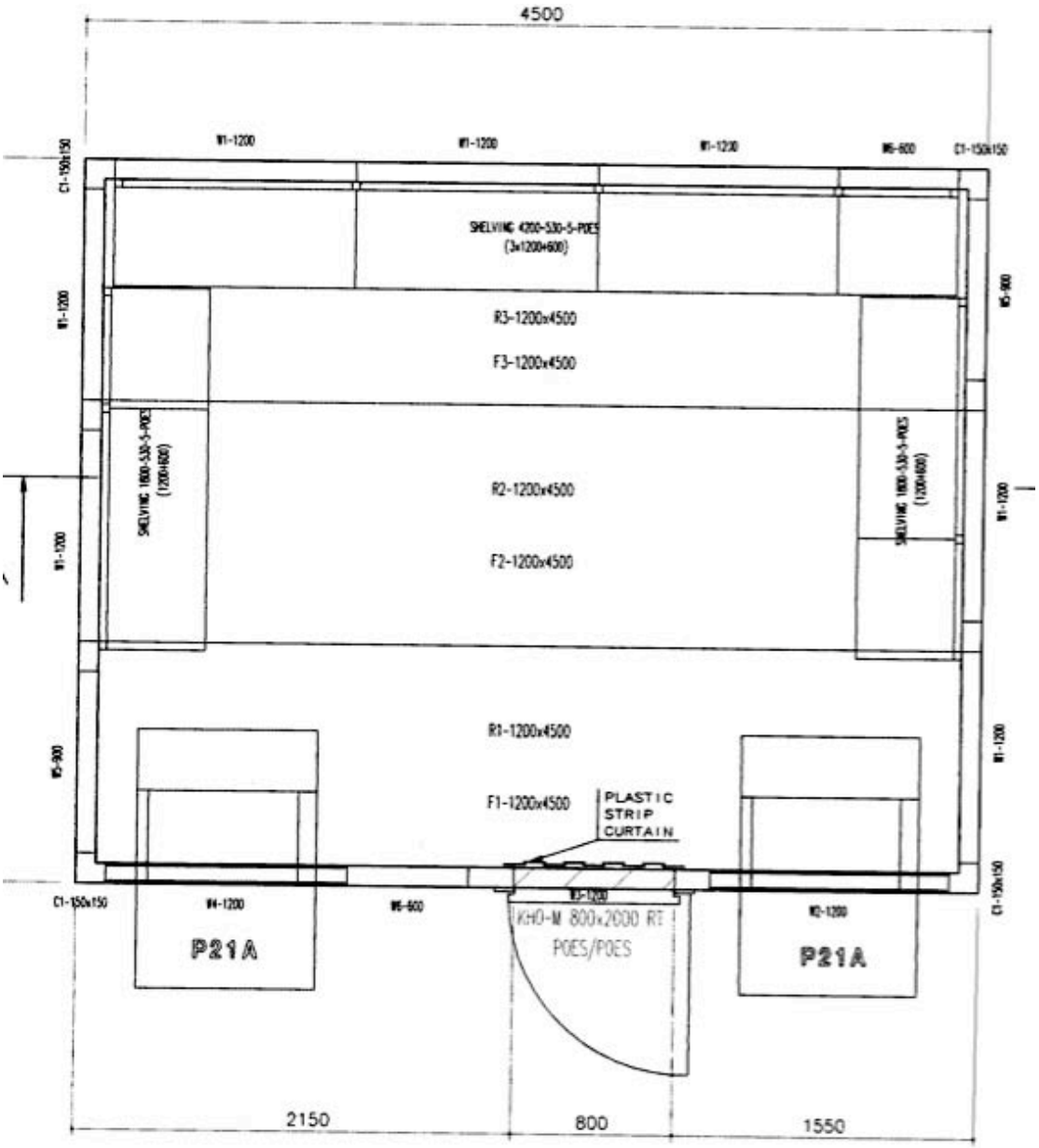
7.9.2. Specifications of cold room(s) to be installed

The site is due for installation of following cold room:

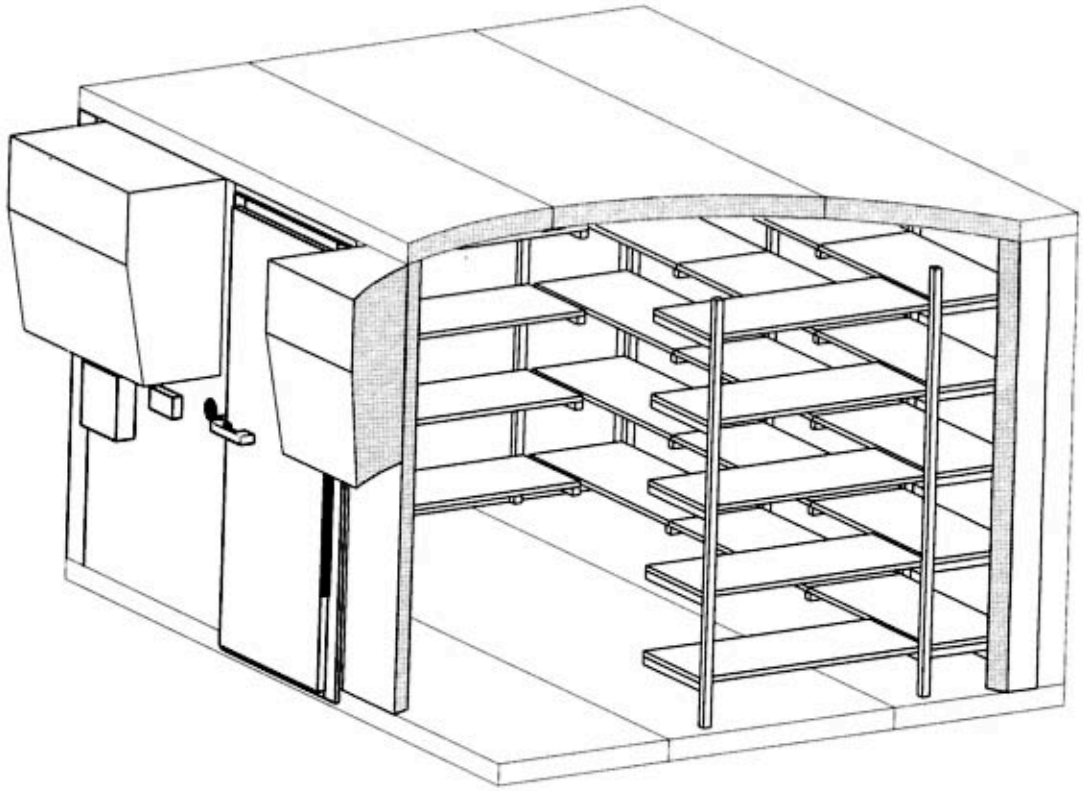
WIC of 30 Cubic Meter size, manufactured by HURREE.

7.9.3. Drawing of cold rooms

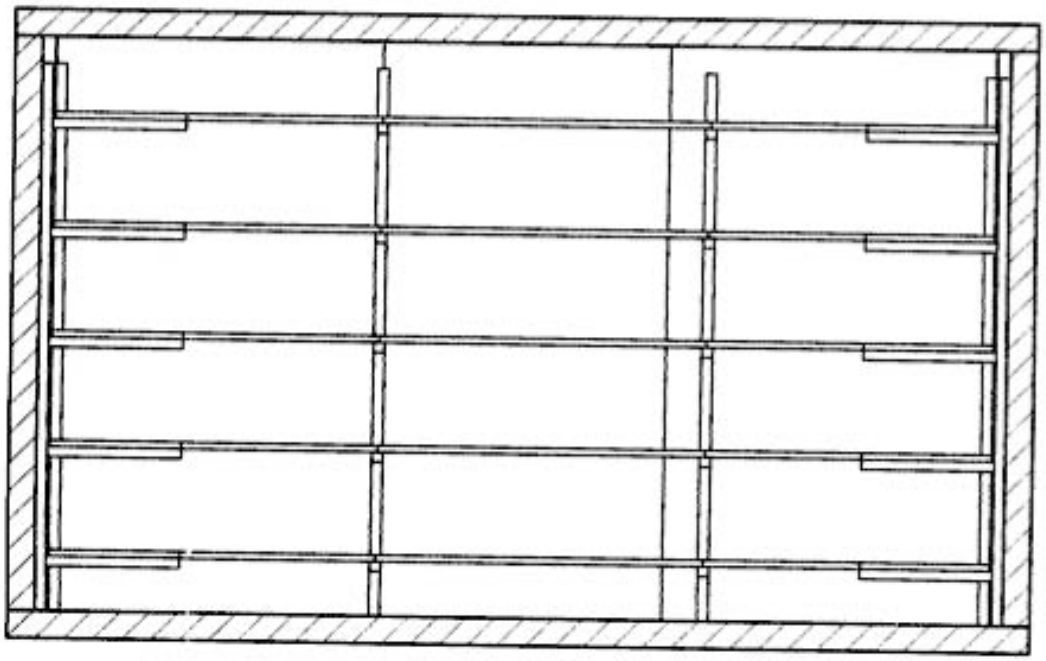
LAYOUT OF 30 M^3, WIC



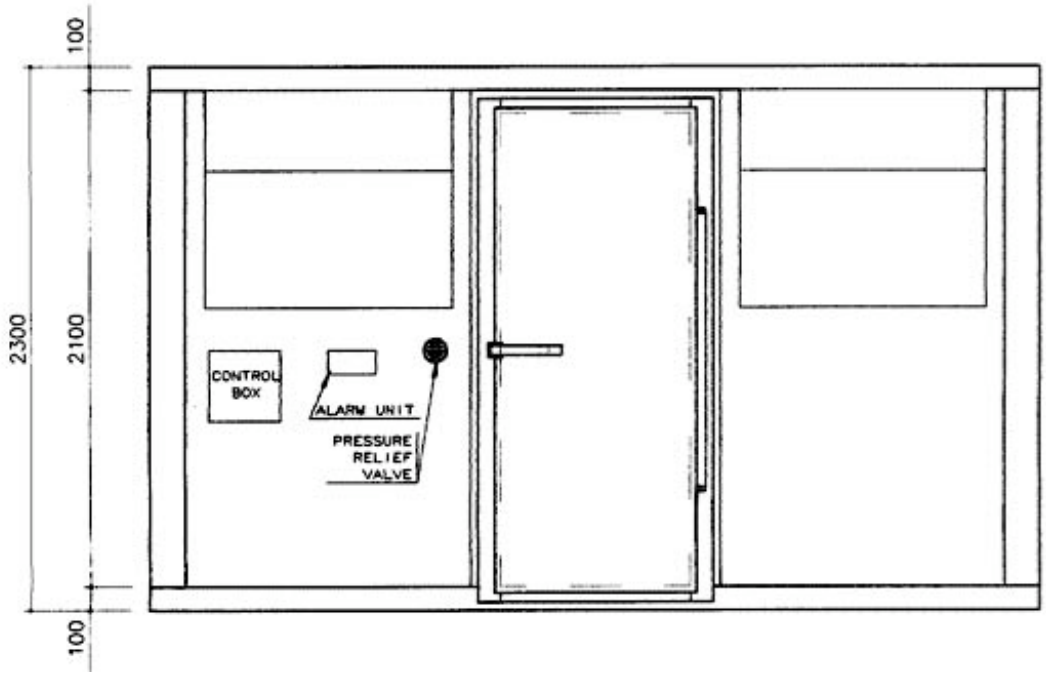
PLACEMENT OF SHELVES IN 30 M^3 WIC



SIDE VIEW OF SHELVES IN 30 M^3 WIC



FRONT VIEW OF WIC 30 M^3 SIZE



7.9.4. Observations

The proposed site is located in the premises of Motilal Nehru District Hospital, OPD ward, Allahabad, Uttar Pradesh.

UNICEF has scheduled to install a 30 m^3, WIC, HUURRE at this site which will require an area of 4.5 m x 3.6 m.

The size of proposed location is 6.6 m x 5.25 m. It is located in the Out-Patient Ward (opposite to the cold store room).

Refer to Figure 24 for a general layout of the Allahabad proposed site.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The site has not received the WIC yet; however the generator and stabiliser arrived on the day of assessment. They were stored at the cargo office until the additional director organized proper storage arrangements.
2) The Additional Director also mentioned that they had already contacted Kirloskar Ltd (manufacturer of the generator) for its installation at the proposed site.
3) The proposed site is the only one available as per the additional director.
4) The hospital has uninterrupted power supply which renders this limited space adequate by the authorities for the installation of the cold room.
5) The site already has vaccine store operational at the location, with an old WIC installed at the store. The Additional director has suggested maintaining the vaccine store at the current place. However, there are ILR's and DF's installed at the proposed location for WIC. Relocation of these equipment to alternative place is under discussion
6) There is a government drug warehouse about 15 KM far from the Motilal Nehru Hospital. This warehouse could be a possible alternative for relocating the vaccine store, but as of now the officials are not in agreement on this option.
7) The current store is being operational out of a very small area, with no space for packing of vaccine, ice-pack conditioning nor storage of consumables.
8) The site has a generator but it has not been operational for a very long time. This does not become a critical issue as long as power supply is guaranteed for 24 hours.
9) An open space has been identified for the installation of the generator. A decision on will be taken would be taken shortly in collaboration with Kirloskar Ltd.

7.9.5. Site status

- ❑ Water supply and sanitary facilities

There is no sink with running water at the proposed location. However, such a facility is available close to the proposed location for washing/cleaning, with a provision to evacuate the water into an underground drain. There are also provisions for draining the water from the floor.

- ❑ Drainage

The building is well drained. The building has an underground drainage system.

Constructing a raised plinth on which the WIC can be mounted will prevent eventual corrosion and provide a safeguard against possible flooding. Pouring of plinth would require an assessment of floor loading capacity.

- ❑ Lighting

The proposed location has adequate lighting with large windows. There is no exposure to direct sunlight at the packing area.

- ❑ Ventilation, heating and cooling

The proposed location has a ceiling height of 2.85 m. The area is well ventilated, with 4 windows of 0.83 m width each. There are no extractor fans, which need to be installed to evacuate the hot air coming from the cooling units.

The location does not require any heating. The room is small in size and a 2 ton air conditioner is sufficient to cool the packing area.

- ❑ Communications

The site does not have room for the storekeeper's office. Separate telephone and telecommunications lines should be installed, which can be linked to the temperature alarms in the cold room and be used for computerized monitoring.

- ❑ Security

The proposed room is housed in the hospital premises, in the corridor of OPD ward with direct access to the general public. The site only has a lockable door thus at risk for theft. Incendiary risks are also high risk as there are no fire extinguishers installed in the premises.

- ❑ Vehicle access and loading convenience

The site does not have direct access to the road preventing vehicles from direct loading and unloading of vaccine. At present, the vaccine is manually transported in cold boxes to the hospital's exit gate, from where it is loaded into the vaccine van. However, the lobby connecting the current vaccine store and the proposed site to the exit gate is broad and adequate to transport cold boxes in and out of store.

- ❑ Security during loading

The site is not adequately secured for loading and unloading of vaccine from vaccine van as there is no loading bay or docking station. Vaccine is loaded manually and cold boxes are often subject to damages during this process.

- Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of building or loading point.

- Loading dock

There is a no loading dock but there is a scope of building one. The loading dock should be constructed next to the exit gate of the building where the vaccine van can dock for easy loading and unloading of vaccine.

- Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and in the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

There is no room for the storekeeper's office. At present, the storekeeper's office is located in the office of the Additional Director, civil lines, Allahabad which is 5 km away from Motilal Hospital. There is a Multi Purpose Health (MPH) worker who handles emergencies at the store.

- Packing area

The site does not have adequate space for packing of vaccine and ice-pack conditioning. At present, ice pack conditioning is not practiced at the store. The lobby outside the present store is often used for packing of vaccine.

- Proposed WIC

The size of the proposed room is inadequate to install the WIC and it cannot be refurbished as per the guidelines. However, a 4.5 m x 3.6 m area has been assigned for assembling the 30 m^3 WIC. It should be assembled 0.6 m away from the rear and sidewalls to allow easy access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 cm to 10 cm thickness needs to be poured to provide a base for the WIC. Figure 24 illustrates where the WIC should be placed.

- Storage of consumables

There is no room for storage of consumables at the proposed site. At present, the stocks are stored in the drug warehouse, or in the office campus of the Additional Director.

- Backup generator

The site does not have an operational backup generator but since the power supply is uninterrupted at the hospital, the need for a generator has not been critical thus far. An empty space has been identified adjacent to present non-operational generator shed for the installation of new 15 KVA generator for the new WIC.

- Power situation and stability

The power supply to the hospital has been stable for the past two years. Reliable power supply has been one of the key factors determining the location for the WIC.

- Electrical safety

Safe electrical fittings have been provided in the building. Electricity supply to the proposed cold room is expected to originate from the central power supply board of the building.

7.9.6. Recommendations linked to installation of cold room

1) The three-phase auto-start generator supplied by UNICEF should be installed to ensure power backup to the newly supplied WIC.
2) A new three-phase 50 A electrical line should be drawn from the central power distribution panel of the building. This line should be drawn directly to a metering and distribution panel mounted near the generator set.
3) New three-phase distribution lines should be drawn from this distribution panel to the WIC. The panel should also be connected through an auto-start to the generator.
4) The electrical supply, distribution panels and circuit protection arrangement for all the cold room installations should be rewired, with appropriate connections to the auto-start generator set.
5) A reinforced concrete slab in the form of a raised plinth of 6 cm to 10 cm thickness should be poured at the location. This will reduce the risk of inundation due to flooding and the likelihood of corrosion when the floors are washed. However, the floors seem to be washed rarely.
6) The required electrical work, including drawing of a 3-phase dedicated power supply with a manual power cut-off switch for the cold room, should be completed.
7) The walls and windows of the room need to be repainted. The walls need to be tiled up to 1.5 meters from the ground level for easy cleaning and maintenance.

7.9.7. Recommendations as per guidelines, not linked to installation of cold room

1) Allocate a separate room for the storekeeper's office near the present cold store. It should be furnished and include a secure lockable cabinet for recordkeeping.
2) Allocate a separate room for storage of consumables. Provide shelves in the storage room.
3) Install two telecommunication lines-data lines connecting cold room and the storekeeper's desk and a telephone line at the desk.

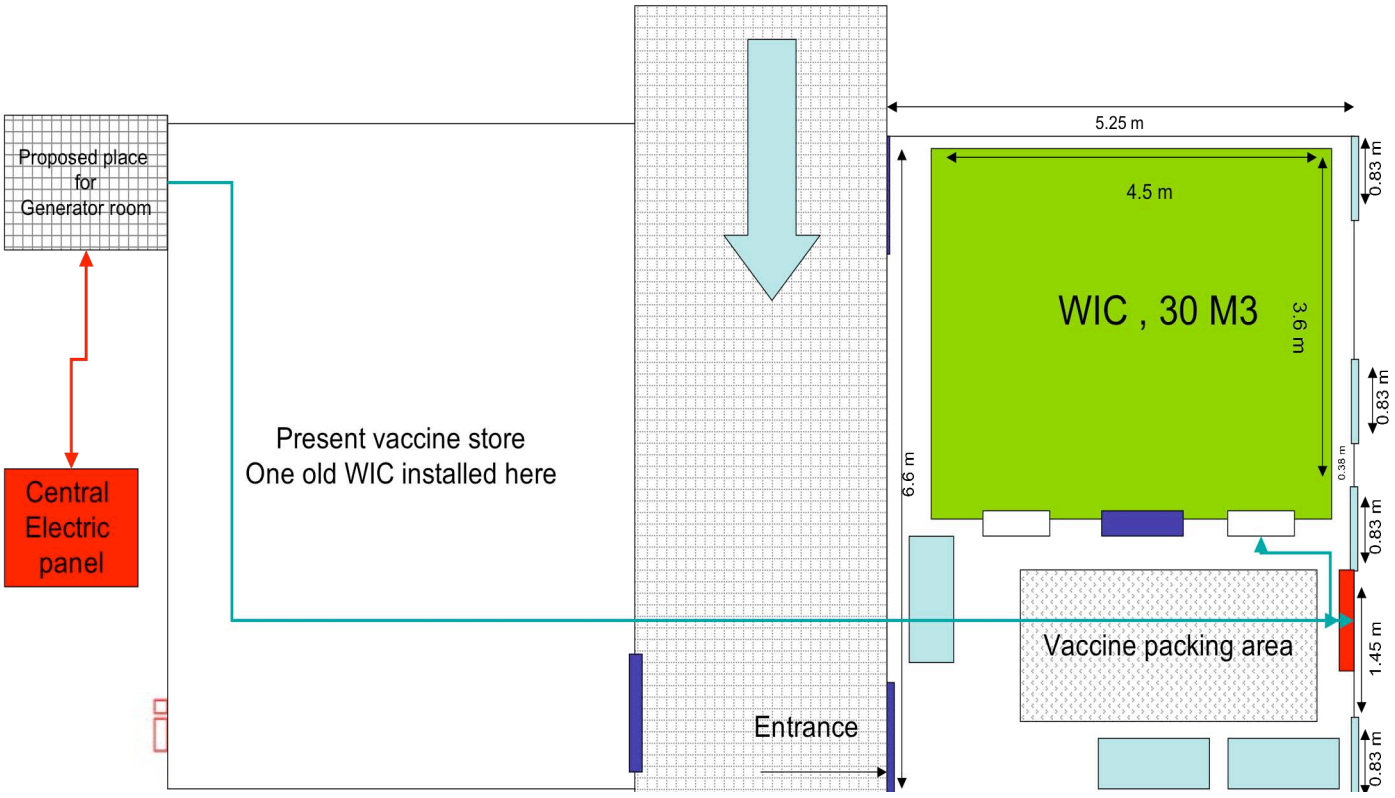
4) Minimise risk of fire by installing fire extinguishers.
5) Install smoke detectors and sprinklers in the vaccine storage areas.
6) Build a hanger along the front of the OPD building.
7) Install two water-resistant electrical sockets on the wall under the hanger.
8) Install benches for icepack conditioning and packaging.
9) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

7.9.8. Conclusion

The proposed installation site is small in size and is just sufficient to commission the WIC. However, it is not possible to implement the cold store standards as per the WHO guidelines. Substantial civil work has to be undertaken before the WIC can be installed. Reliable power supply is the primary factor that recommends installation of the cold room at this site.

7.9.9. Drawing of site proposed

Figure24: Layout of proposed site for WIC, Allahabad



7.10. BIKANER, RAJASTHAN

SITE ASSESSMENT REPORT FOR INSTALLATION OF WIC IN BIKANER

TO

DR S L GODARA, RCH OFFICER

DEEPAK GOSWAMI, STATISTICAL OFFICER

NAND KUMAR VYAS, REFRIGERATION MECHANIC

INDER SINGH, STORE IN-CHARGE

AT

SWASTHYA BHAWAN, TYAGI VATIKA,
STATION ROAD, BIKANER

SITE ASSESSMENT CARRIED ON 10 JULY 2007

7.10.1. Background

UNICEF has designated IT Power India to inspect and install the walk-in cold rooms at 11 locations in India, which includes 4 Walk-in Freezers (WIF), 8 Walk-in-Coolers (WIC) and the replacement of 4 cooling units of 2 WIFs. With reference to the Special Service Agreement with UNICEF (number: SSA/INDQ/2007/00001015-0) following activities are to be performed by ITPI

1) Assist in identification and need assessment of suitable location at the proposed site selected by state government authorities/UNICEF
2) Installation of WIC/WIF at these proposed site as per guidelines provided in contract subject to:
3) All civil and electrical work at site completed by state government of respective sites.
4) All required material including WIC WIF parts are available on site (to be arranged by state government)

The evaluation parameters were evolved from The Guideline for Establishing or Improving Primary and Intermediate Vaccine Stores [(WHO/V&B 02.34) Version December 2002] and Equipment performance specifications and test procedures: Cold rooms and Freezer Rooms (WHO V&B 02.33).

Mr Ranjit Dhiman, Cold Chain Consultant, IT Power India visited the proposed sites for inspection.

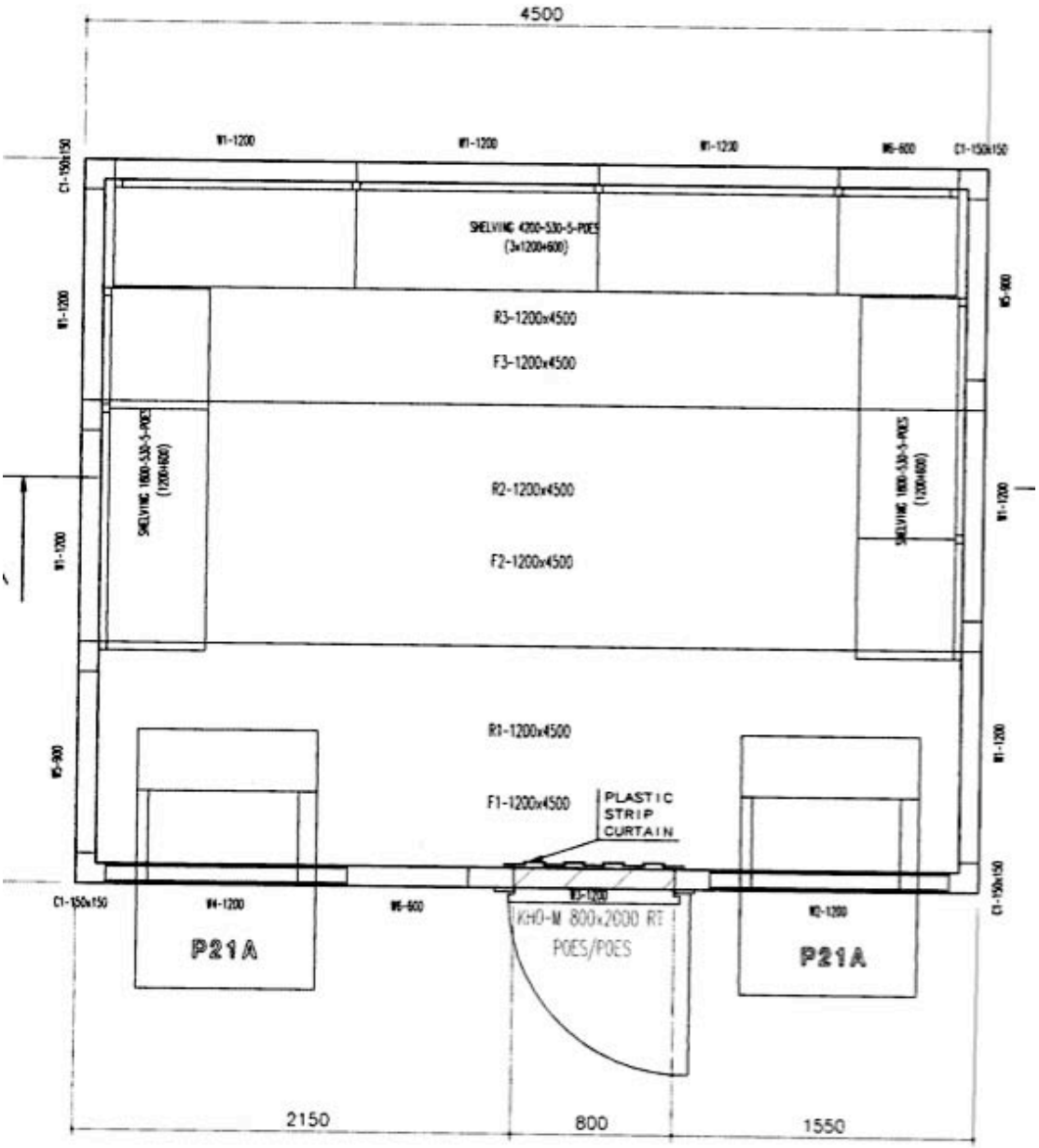
7.10.2. Specifications of cold room(s) to be installed

The site is due for installation of following cold rooms:

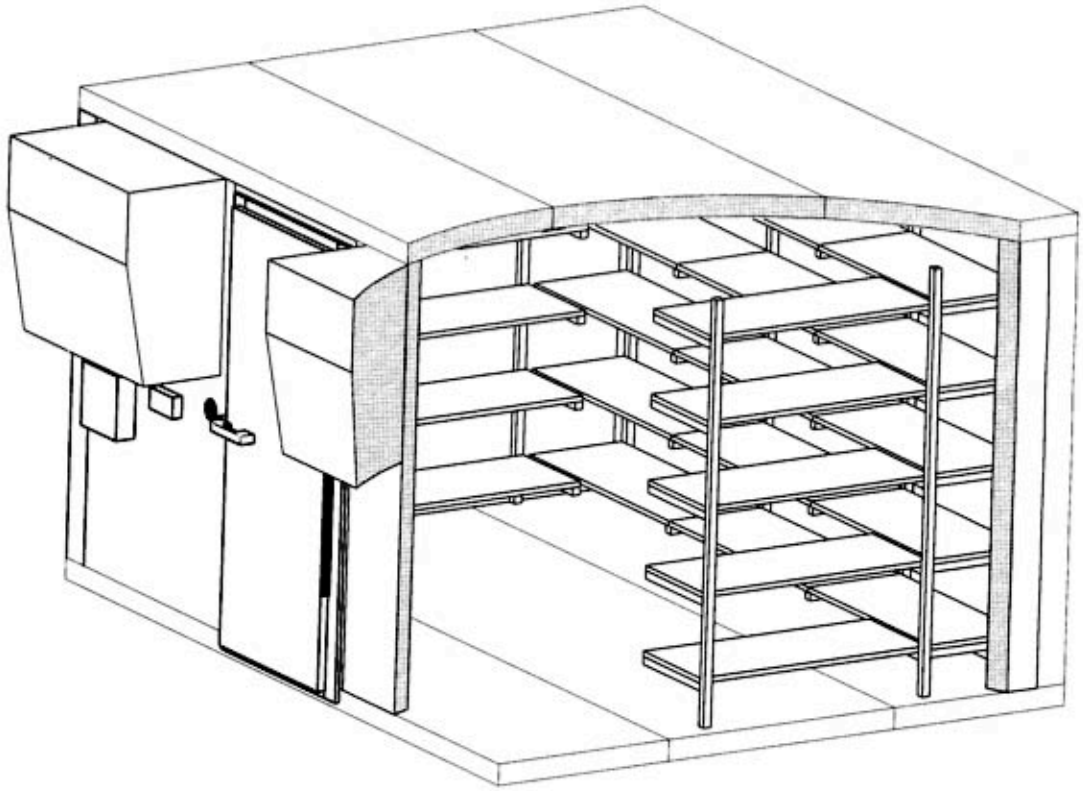
WIC of 30 Cubic Meter size, manufactured by HURREE.

7.10.3. Drawing of cold rooms

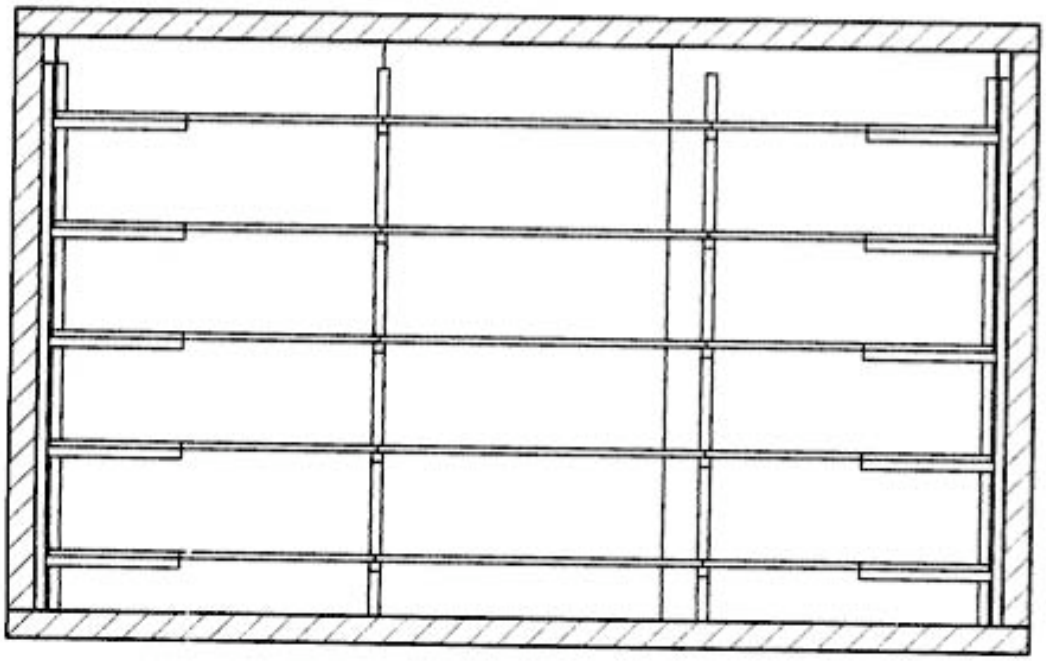
LAYOUT OF 30 M^3, WIC



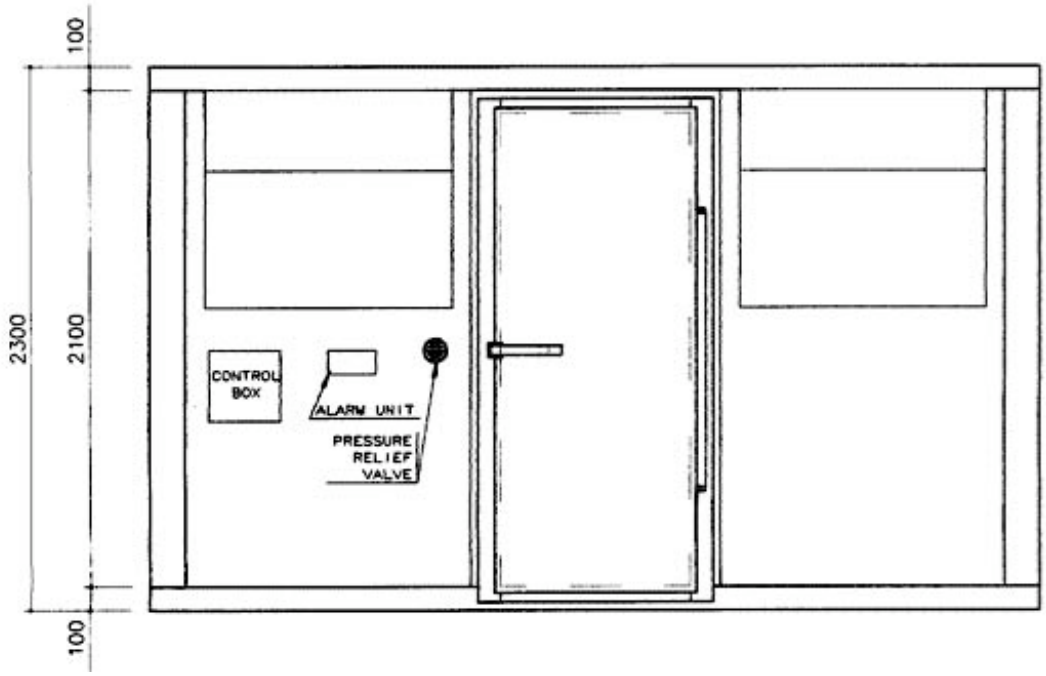
PLACEMENT OF SHELVES IN 30 M^3 WIC



SIDE VIEW OF SHELVES IN 30 M^3 WIC



FRONT VIEW OF WIC 30 M^3 SIZE



7.10.4. Observations

The proposed site is located in the premises of Swasthya Bhawan, Tyagi Vatika, Station road, Bikaner 334001, Rajasthan. The proposed location has been constructed to host the new WIC.

UNICEF has scheduled to install a 30 m^3, WIC, HUURRE at this site which will require an area of 4.5 m x 3.6 m. The size of the proposed location is 6.6 m x 5.25 m.

See Figure 25 for a general layout of the Bikaner proposed site for WIC.

With regard to the cold chain system and the site conditions, the following needs to be noted:

1) The current vaccine store operates from the RCH office, opposite to PB hospital. The new site is located about 8 Km away from the current store. The vaccine store would be permanently shifted to Swasthya Bhawan after the installation of WIC.
2) The room has been especially constructed as per the UNICEF guidelines. However, due to lack of space, the storekeeper's office cannot be accommodated here.
3) The site is yet to receive the WIC; however, the 15 KVA generator and the Servo stabilizer have been supplied. The generator is currently stored in the room meant for the WIC.
4) The refrigeration mechanic, Mr Nand Kumar Vyas, has overseen the construction and furnishing of the room to ensure that the requirements have been met. A room attached to the proposed location for the WIC has been allotted to install the generator. The electrical distribution panel along with the circuit breakers and change-over switch have already been installed.
5) A separate room has been constructed next to the WIC room for the cold-chain refrigeration workshop. This room should be converted into the storekeeper's office. This room can also accommodate the consumables and the DFs.
6) The site does not have a dedicated 3-phase power supply line for the cold room. Mr. Vyas has suggested drawing the electrical line drawn from the state electricity board transformer close to the Swasthya Bhawan.
7) Telephone lines are available within seven days of advance notice.
8) The proposed room is adjacent to the drug warehouse, which is managed by the store in-charge, Mr Inder Singh. His office is located within the store. The store could also double up as the vaccine storekeeper's office.
9) The site is ready for installation of WIC, subject to availability of power supply and completion of the minor civil work recommended in the Section 7.10.6.

7.10.5. Site status

- ❑ Water supply and sanitary facilities

The proposed location has water supply. A sink is available for washing/cleaning, and provision has been made to evacuate water into an underground drain. A separate washroom has been constructed next to the WIC room.

- ❑ Drainage

The room is well drained since provisions for drainage have been taken into consideration during the construction. Constructing a raised plinth on which the WIC can be mounted will prevent eventual corrosion and safeguard against possible flooding. To pour the plinth the floor-loading capacity would need to be assessed.

- ❑ Lighting

The proposed location has one large window, one ventilation window and a large shutter gate, which contribute to adequate lighting. There is no exposure to direct sunlight at the packing area.

- ❑ Ventilation, heating and cooling

The location proposed for the WIC has a ceiling height of more than 4 m. It is well ventilated, with 1 large door (1.8 m wide and 2.4 m high), 1 large window and 1 ceiling window on the wall opposite to the door. There are no extractor fans but there is a provision for installing one.

The room may require cooling during the summer and heating during the winter. This requirement can be met with a 2-ton air conditioner and a warm-air dispenser.

- ❑ Communications

There are no telephone lines at present in the proposed room. However it was suggested that a phone and data line would be available in a week's notice.

The telephone and telecommunications lines should be drawn so that the storekeeper's office line can eventually handle data transfer and the cold room lines can be linked to the temperature alarms and used for computerised monitoring.

- ❑ Security

The cold store facility is housed in a secured compound with guard services. The room is lockable. Security threat with respect to theft or vandalism is considered very low. But a security risk with respect to fire is high as there are no fire extinguishers installed in the room.

- ❑ Vehicle access and loading convenience

Vehicle can easily dock at the platform located near the gate of the store. The vaccine can be directly loaded into vehicle from the packing area. There is ample parking space. The building has direct main road access.

- ❑ Security during loading

The site is adequately secured for vaccine loading due to the presence of a dock station. The vaccine is directly loaded into the vehicle from the store.

- Weather protection during loading

At present, there is no protection at the loading point. This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of building or loading point.

- Loading dock

A loading dock has been constructed adjacent to the storeroom's exit. It is constructed at a height of 1.06 m from the ground level.

- Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area or the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

- Storekeeper's office

There is no room for the storekeeper's office. Officials have yet to finalize a suitable location for the storekeeper's office in Swasthya Bhawan. The layout for the office is shown in Figure .

- Packing area

There is a space available of 2 m X 4 m next to the door of the proposed room. This space should be used for ice-pack conditioning and vaccine packing.

- Proposed WIC

A space of 4.5 m x 3.6 m has been assigned at proposed location for assembling the 30 m^3 WIC. It should be assembled 0.6 m away from the rear and sidewalls to allow easy access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 cm to 10 cm thickness needs to be poured to provide a base for the WIC. Figure 25 shows the placement of the WIC.

It is to be noted that there is no scope of installing the ILRs and DFs in the room.

- Storage of consumables

A separate room with limited access has been constructed for the storage of consumables. This may be risky to store diluents.

- Backup generator

A room with adequate size and location is available to house the new 15 KVA generator and the stabilizer. The electrical distribution box has been mounted.

But there are two problems with the generator room:

The door is 1.05 m in size, which prevents easy manipulation of the generator into the room. By removing the door from it hinges, there will be ample space to shift the generator.

The generator room is accessed through WIC room. Once the WIC is installed, the generator will no longer be accessible for major repair or

replacement. This constrain could be addressed by creating another door in the generator room with direct access to the road.

- ❑ Power situation and stability

Power supply has been reportedly stable at the Swasthya Bhawan and power cuts have been negligible. A dedicated three-phase power line will be drawn from the nearby transformer.

- ❑ Electrical safety

The electrical wiring and fittings meet the standard requirements. There is a very low risk of a fire breaking out from the electrical wiring and fittings.

- ❑ Circuits with correct rating

Circuits have been fitted with proper rating at the distribution and change over panel mounted in the generator room.

7.10.6. Recommendations linked to installation of cold room

1) The three-phase auto-start generator supplied by UNICEF needs to be installed to ensure power backup to the new WIC.
2) A wide door needs to be built in the generator room to allow the transport of the generator for major repairs. The door should open on to the road, enabling direct access to the room. The current entrance, which opens into the room hosting the WIC, should be used only to operate the generator.
3) A new three-phase 50 A electrical line should be drawn from the electrical transformer near to the building. This line should be drawn directly to a metering and distribution panel mounted near the generator set.
4) New three-phase distribution lines should be drawn from this distribution panel to WIC. The panel should also be connected through an auto-start to the generator.
5) A reinforced concrete slab in the form of a raised plinth of 6 cm to 10 cm thickness should be poured where the WIC is to be placed. It will reduce the risk of inundation due to flooding and corrosion when the floors are washed.

7.10.7. Recommendations as per guidelines, not linked to installation of cold room

1) Allocate the room next to WIC for storekeeper office. This room is presently used as a refrigeration workshop.
2) Create lockable partition in the proposed storekeeper's office to store consumables.
3) Install two telecommunication lines (data lines at the store keeper's desk).

4) Provide shelves in the storage room.
5) Furnish the storekeeper's office as per the layout suggested in Figure and include a secure lockable cabinet to keep records.
6) Minimise risk of fire by installing fire extinguishers in WIC room, generator room and storekeeper's office.
7) Install smoke detectors and sprinklers in the vaccine storage areas.
8) Build a hanger along the loading dock outside the cold store.
9) Install two water-resistant electrical sockets on the wall under the hanger.
10) Install benches for icepack conditioning next to vaccine packing area at the proposed site.
11) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

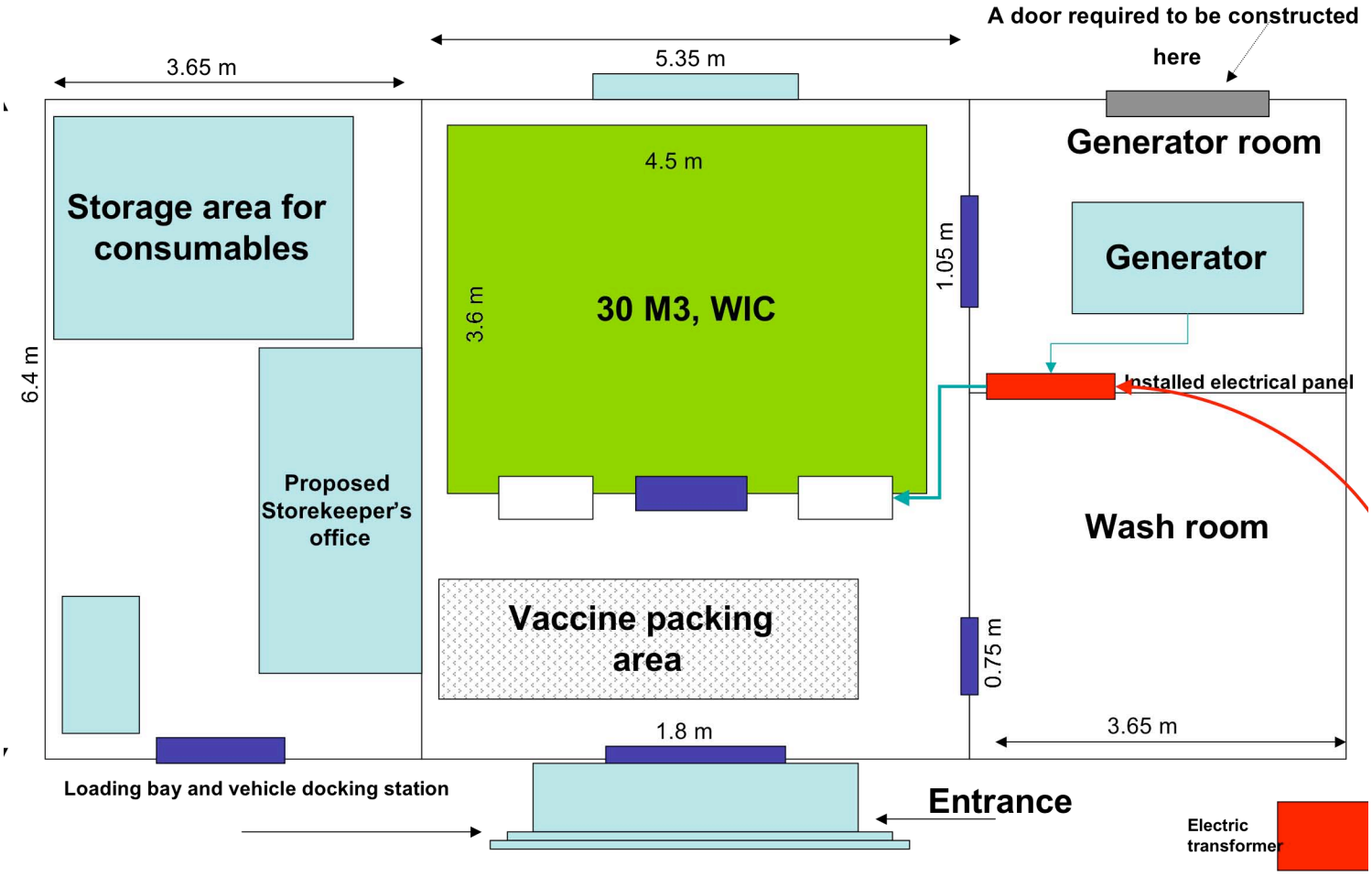
7.10.8. Conclusion

The officials have made the best use of the available resources and facilities to plan and prepare the site for the WIC installation. The proposed site for the WIC has insufficient space to house a vaccine store; however, there are other rooms next to the proposed site, which should be allotted to the vaccine store.

Apart from the dedicated 3-phase electrical line and minor civil work, the site is ready for installation. The power lines can be drawn with a one-week's notice prior to installation of the cold room.

7.10.9. Drawing of site proposed

Figure 25.


A door required to be constructed here
3.65 m
5.35 m
Generator room
Storage area for consumables
4.5 m
30 M3, WIC
3.6 m
1.05 m
Generator
6.4 m
Installed electrical panel
Proposed Storekeeper's office
Wash room
Vaccine packing area
0.75 m
1.8 m
3.65 m
Loading bay and vehicle docking station
Entrance
Electric transformer

7.11. KOLKATTA, WEST BENGAL

SITE ASSESSMENT REPORT FOR INSTALLATION OF COOLING UNITS IN KOLKATTA

TO

MR ARBINDO ROY, SENIOR STORE SUPERINTENDENT

VIJAY KUMAR JHA, UDC

BASANTA KUMAR HENS, PHARMACIST

AT

MEDICAL STORE DEPORT, NO 9, CLIDE ROW, HASTINGS, KOLKATTA

SITE ASSESSMENT CARRIED ON 12 JULY 2007

7.11.1. Background

UNICEF has designated IT Power India to inspect and install the walk-in cold rooms at 11 locations in India, which includes 4 Walk-in Freezers (WIF), 8 Walk-in-Coolers (WIC) and the replacement of 4 cooling units of 2 WIFs . With reference to the Special Service Agreement with UNICEF (number: SSA/INDQ/2007/00001015-0) following activities are to be performed by ITPI

1) Assist in identification and need assessment of suitable location at the proposed site selected by state government authorities/UNICEF
2) Installation of WIC/WIF at these proposed site as per guidelines provided in contract subject to:
3) All civil and electrical work at site completed by state government of respective sites.
4) All required material including WIC WIF parts are available on site (to be arranged by state government)

The evaluation parameters were evolved from The Guideline for Establishing or Improving Primary and Intermediate Vaccine Stores [(WHO/V&B 02.34) Version December 2002] and Equipment performance specifications and test procedures: Cold rooms and Freezer Rooms (WHO V&B 02.33).

Mr Ranjit Dhiman, Cold Chain Consultant, IT Power India visited the proposed sites for inspection.

7.11.2. Specifications of cold room(s) to be installed

The site is due for replacement of 4 cooling units.

7.11.3. Observations

The Medical Store Depot, Hastings, Clide row, Kolkatta is one of the 4 MSD's in India. The facility has large vaccine storage facility, including 3 WIFs, 3 cold rooms of old construction with concrete walls. Two of the currently installed WIFs were reported to be malfunctioning. The cooling units of these 2 WIFs were found to be defective. UNICEF has supplied 4 new cooling units to replace the faulty ones.

The site has received the cooling units and they are store at that location.

7.11.4. Status of WIF

1) One of the two WIFs in need of cooling units replacement is operational but rarely used. The body of the cold room is in good condition. There is ample space available next to the WIF to carry out repair and replacement of units. The units can be replaced immediately.

2) The other WIC is in poor condition. The body of the freezer room has rusted and there are several cracks visible in its walls. There is evidence of repair and filling of cracks with silicone. However, the WIF is not in an operational condition. Therefore, its cooling units should not be replaced.
3) The third WIF, which is operational, has ice formation at the evaporator. Currently, the storekeeper alternates the use of these units. As a unit is used, the other is defrosted.
4) There is no operational generator for cold rooms at the site. A 50 KVA generator is awaiting installation.

7.11.5. Recommendations

1) Replace the cooling units of first WIF.
2) Replace the entire freezer room (WIF 2) with a new one as the body of the WIF has rusted.
3) Install the 50 KVA generator to provide back to these cold room. Generator should be connected through a central distribution system with individual circuit breakers for each room.
4) Re-program the third WIF cooling unit in such a way that the defrosting cycle is adequately timed. Defrosting allows the ice to melt, and prevents blockage of draining pipe. Also align the placement of the sensor at the evaporator unit in such a way that defrosting happens before ice forms, and align the plate underneath the evaporator to ensure that the water flows out through the drain pipe and does not stagnate in the tray.

7.11.6. Conclusion

One of the two WIFs can be replaced immediately. The second unit needs to be subject to a life-cycle feasibility analysis by a qualified engineer; till then it is advisable not to replace the cooling units of this WIF. The generator should be installed on a priority basis as there is no power backup at the store.

8. MEERUT SITE ASSESSMENT REPORT 2006

WIF SITE INSPECTION REPORT: MEERUT

PREPARED FOR UNICEF

BY

IT POWER INDIA

DATED: 30 MARCH AND 29 APRIL 2006

TABLE OF CONTENTS

1. BACKGROUND

UNICEF designated IT Power India to inspect the site in Meerut, where a Walk-in Freezer (WIF) is awaiting installation, and to recommend improvements required prior to installation to ensure optimal operational efficiency.

The evaluation parameters were sourced from *The Guideline for Establishing or Improving Primary and Intermediate Vaccine Stores* [(WHO/V&B 02.34) Version December 2002] *and Equipment Performance Specifications and Test Procedures: Cold Rooms and Freezer Rooms* (WHO V&B 02.33).

Mr Soren Spanner, Cold Chain Consultant, UNICEF and Mr Ranjit Dhiman, Cold Chain Consultant, IT Power India visited the proposed site on 30 March 2006. Mr Ranjit Dhiman revisited the site on 28 April 2006.

2. SITE ADDRESS

Office of Additional Director Health and Family Welfare

Lala Lajpat Rai Medical College

Garh Road, Meerut, Uttar Pradesh

3. OFFICERS MET

Dr J G Vohra, Sub-Regional Coordinator, WHO

Dr S K Jain, Assistant Additional Director (AAD), Health and Family Welfare

Mr Anil Kumar, Store Keeper

Mr Daya Shankar, Sub-Regional Coordinator, UNICEF, Meerut

4. PROPOSED LOCATION

The proposed site is located in a newly constructed two-storey building, which also houses the office of the Additional Director of Health and Family Welfare. The existing intermediate store operates from here. Dr S K Jain, AAD, has offered two rooms with similar dimensions; the WIF could be installed in either of these rooms. One room is located on the ground floor (location "A") and the other on the first floor (location "B"), exactly above location "A". It is suggested that location "A" be used for the WIF, while location "B" is available to host a new WIC, which is essential at the site though procurement is yet to be planned.

A general layout of the Meerut cold store facility is provided in **Error! Reference source not found.**.

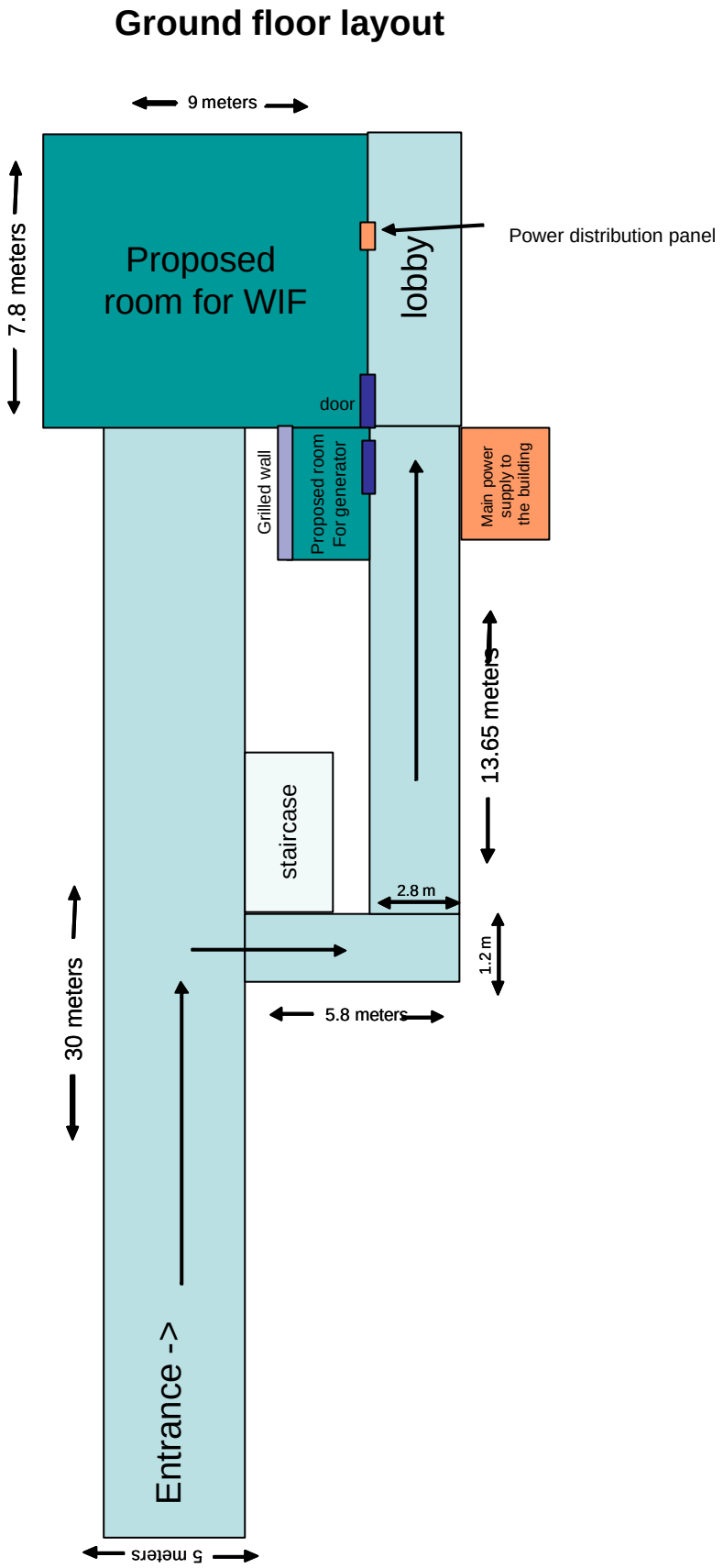


Figure 1: Layout of Meerut cold store facility (ground floor) and suggested locations for the new WIF

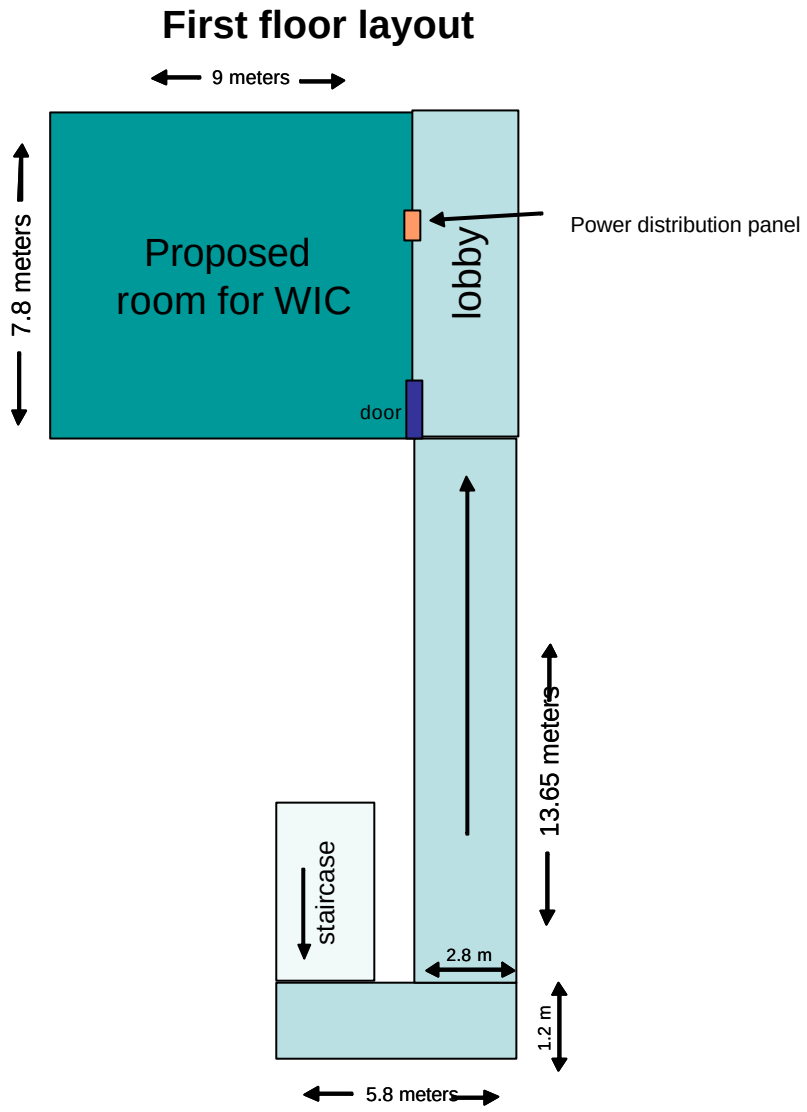


Figure 2 :Layout of Meerut cold store facility (first floor) and suggested locations for the new WIC

UNICEF has supplied a new 30 m^3 WIF, which will require an area of 4.5 m x 3 m. The consultants inspected two alternative locations in the same building for the installation of the WIF (one on the ground floor and the other on the first floor).Both the proposed rooms are of the same size? 7.8 m x 9 m. The ground floor location is considered to be more appropriate to install the new WIF for the following reasons:

- Immediately adjacent to this location is another small room 3.5 m x 2.6 m in size, which is available for installation of generator.
- First floor room is already being occupied by DF's and ILRs and is presently used to store OPV vaccine and prepare ice-packs.

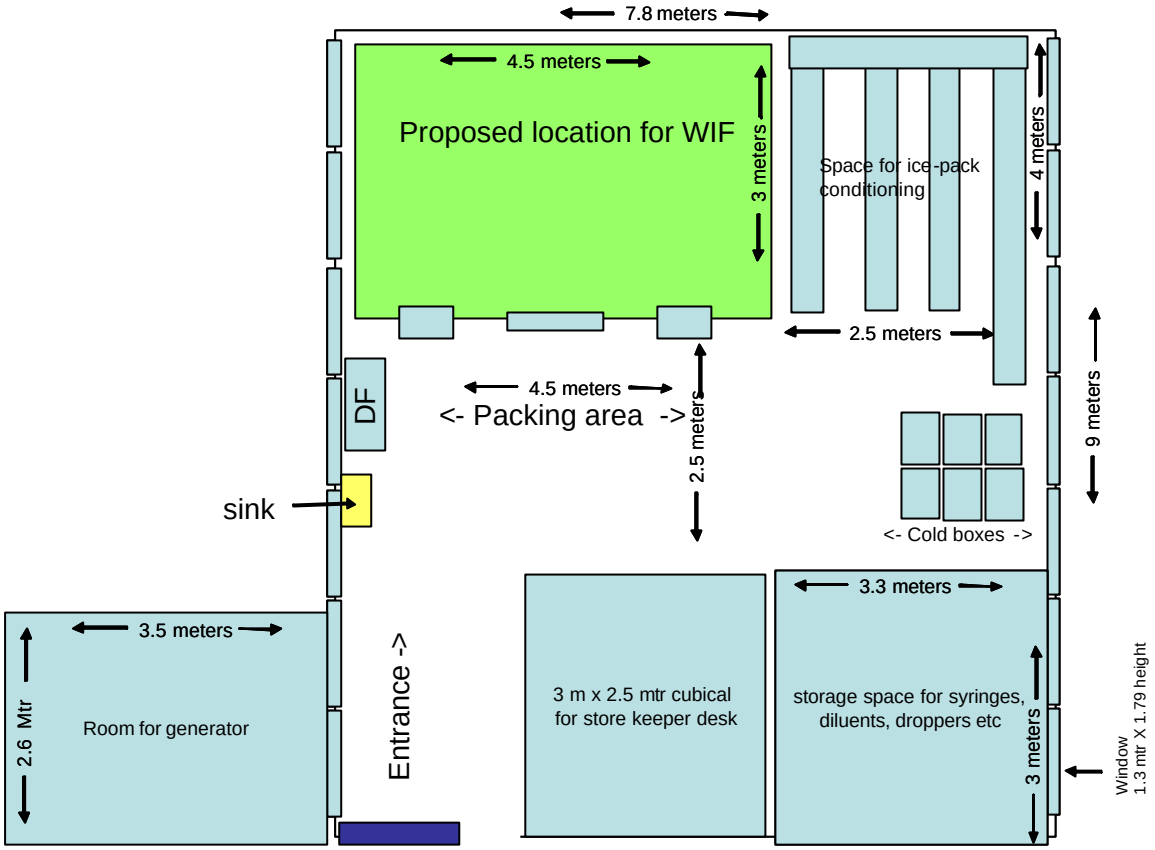


Figure 3: Proposed location (A) for installation of WIF

The WIC of the store is located 8 KM away from the proposed site and the WIC is more than 20 years old. It is proposed to allocate a new WIC for the site which can be installed on location "B" on the first floor.

5. EXISTING WIF/WIC INSTALLATIONS

With regard to the cold chain system and the site conditions, the following needs to be noted:

- Presently, there is a cold store in the proposed building (on the first floor). The store is managed by the storekeeper Mr Anil Kumar.
- The store has four large ILRs and five large DFs, which are working..
- There is a WIC installed at the PL Sharma District Hospital, Ahmed Road, Meerut, which is 8 km away from the proposed site. This WIC is more than 20 years old and should be replaced with a new one. The new WIC can be placed in the same building as the suggested location for the WIF. The PL Sharma District Hospital does not have enough space to host both a WIC and WIF.
- Vaccine is shipped to seven districts from this present store, serving an estimated population of 20 million. Shipment is usually done in two lots—OPV and measles is despatched from the LLR Medical College store, while the rest of the vaccine is despatched from the district hospital where the WIC is installed.

- The proposed room (location "A") has been refurbished with electrical wiring and wall point plugs. A new power distribution panel with three-phase power is being installed in the room. During the initial visit, odd bits of furniture and equipment unrelated to the cold chain were stored in the room (Refer to Appendix 2 for images) The room has now been cleaned up.
- The dimensions of the rooms (both locations "A" and "B") are: 9 m by 7.8 m with a height of 3.56 m. The size of the WIF to be installed is 30 m^3 (4.5 x 3 x 2.1) m.
- The rooms ("A" and "B") are well ventilated; each has 14 windows—1.69 m by 1.3 m in size. There are seven windows each on two of the four walls of the room. There are two entry doors, wide enough for the cold boxes to be carried in and out easily.
- Both the rooms have shelves and also two cabinets with wooden doors that can be locked.
- There is sufficient room (as per WHO norms and EVSM criteria) for vaccine packaging; a desk and chair for the storekeeper; and sufficient space to store cold boxes, diluents, syringes and droppers (Please refer to Figure 3).
- There is a provision of 3 phase power supply to both the rooms.

6. STORE BUILDING

6.1. Water supply and sanitary facilities

There is no water supply to location "A" and "B" but plumbing connections are available in the building. Sanitary facilities are adjacent at less than 10 m. A sink for washing/cleaning is required with a provision to evacuate water into an underground drain. The most suitable location for the washing/cleaning sink is shown in **Error! Reference source not found.**.

6.2. Drainage

The building is constructed in such a way that all the water drains away and there is no retention of water. The building has an underground drainage facility. The internal drainage facility runs from the first floor.

Constructing a raised plinth on which the WIF can be mounted will prevent eventual corrosion and provide a safeguard against possible flooding.. The floor loading capacity would have to be assessed before the plinth is constructed.

6.3. Lighting

The building has recently been fitted with an electrical circuit. Electrical refurbishment is being carried out presently and fresh sockets and plugs are being installed. This ensures adequate lighting for general use and packing. WIF will be exposed to direct sunlight as room has 7 windows on each of the 2 sides (refer to Figure 3). Windows adjacent to the suggested placement of WIF should be covered or permanently closed.

6.4. Ventilation, heating and cooling

Location "A" proposed for the WIF has a ceiling height of 3.56 m . It is well ventilated, with 14 large windows 1.3 m in width and 1.79 m height. There is no provision for installation of extractor fans..

Extractor fans are required in on one side of the building, from where the cold room chiller air is evacuated.

Two air conditioners of 1.5 tonnes capacity should be installed outside the room, below the window space in the cold room. This will render the space used for packing, at a low cost.

Location "A" does not require any heating . During the winter months from Dec.-Mar., a small gas-powered space heater is proposed for the storekeeper's office.

A similar configuration is applicable to location "B", except that location "B" requires the roof to be protected with a double skin for passive cooling.

6.5. Passive cooling

The proposed location " A" is on ground floor and is covered by a similar sized room on first floor (location "B"). Location "A" does not require passive cooling. Location "B" building has a flat concrete roof. The heat retention and cooling load can be substantially reduced by adding a simple double skin (Slabs not to exceed 6cm in thickness) to the flat roof to shade it from direct sunlight. A simple schematic of the suggested arrangement is shown in Figure 4.

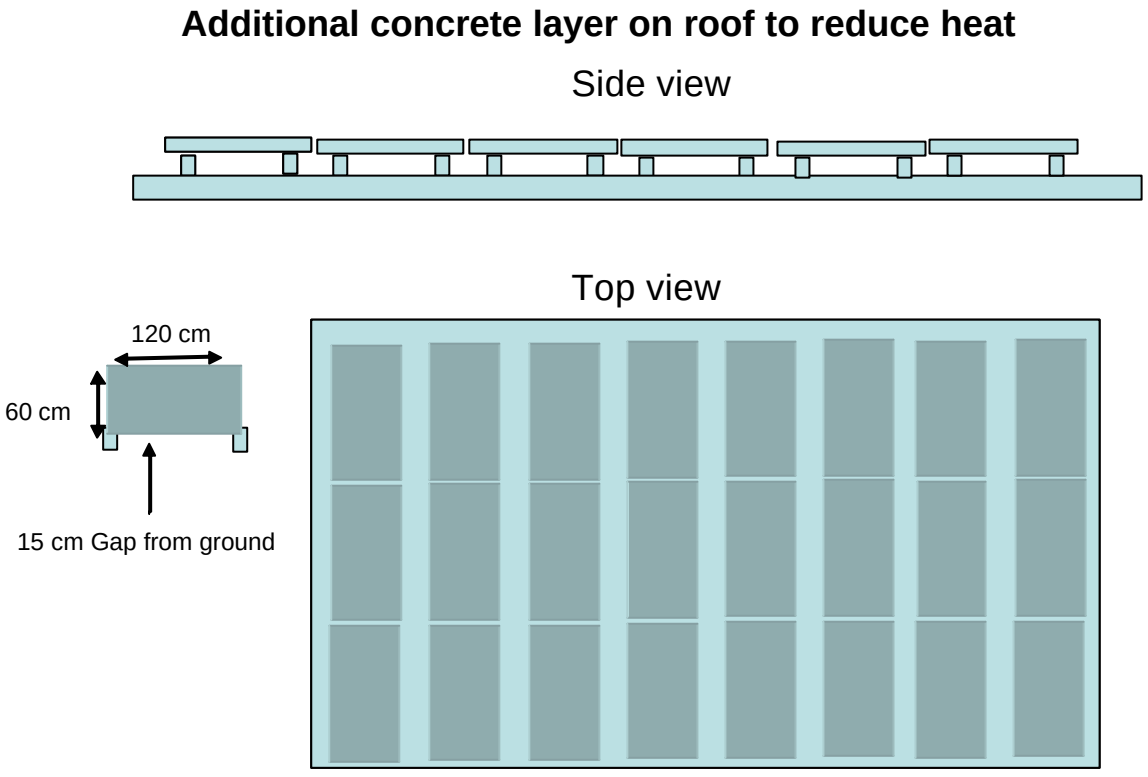


Figure 4: Layout of roof top for passive cooling

6.6. Communications

The storekeeper's office (placed in location "A") and location "B" require a telecommunications line and hand sets. The telephone and telecommunications lines should be kept separate so that the storekeeper's office line can eventually handle data transfer and the WIF room line can be linked to the temperature alarms and used for computerised monitoring WIF and proposed WIC.

6.7. Security

The cold store facility is housed in a high -walled compound with guard services. the space allocated (Location “A” and “B”) are lockable. Security threat with respect to theft or vandalism is considered very low Security risks with respect to fire is substantially more significant, as there are no fire extinguishers. The main electricity board on first floor with meter and fuse, is placed in wooden box and is prone to catch fire in event of short circuit.

7. SPACE AND CONVENIENCE OF USE

7.1. Vehicle access and loading convenience

Vehicles cannot directly access Location “A” and “B”. Currently, for the already operating store , packed vaccines are transported by hand approximately 50 m down the stair to a location from where they are loaded onto the vehicles (refer to Figure 1 and Figure 2). However the passageway which vehicle can reach and vaccine is loaded is broad and adequate for vaccine loading.

7.2. Security during loading

The site is adequately secured for loading..

7.3. Weather protection during loading

At present, there is no protection at the loading point This constraint can be addressed by constructing a corrugated or fibre board hanger outside the entrance of building or loading point (Refer Figure 5). This would also provide protected loading for supplies to and from the WIC proposed on the first floor.

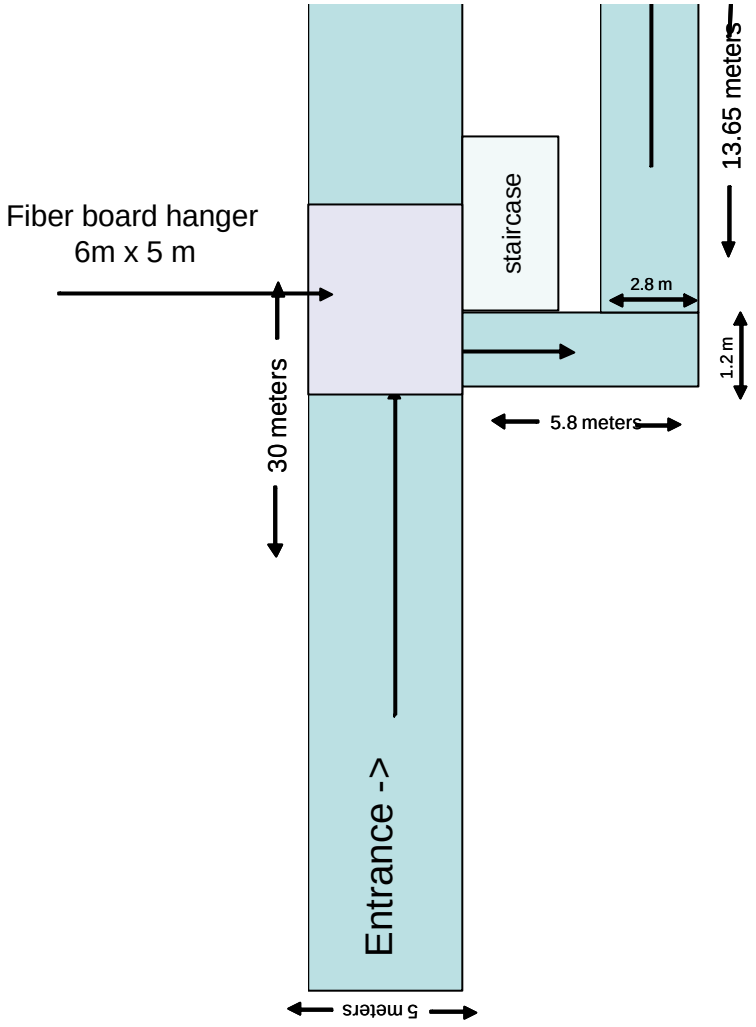


Figure 5: Vaccine loading area

7.4. Loading dock

There is no loading dock, but there is a scope to build one. The floor of building entrance is , approximately 30 cm higher than the passageway

7.5. Electrical outlet to couple refrigerated trucks

There are no electrical outlets at the loading area and at the passageway. Two outlets using water-resistant sockets should be mounted on the wall of building next to entrance gate under the hanger.

7.6. Storekeeper's office

The size of the storekeeper's office is 2.7 m x 3 m and the room has direct access from the outside of the building where the WIF is proposed to be installed. Sufficient natural light enters the room The furniture in the office should be placed as shown in Figure 6, which requires a minimum area of 7.5 m^2. Records can be maintained and kept in this office.

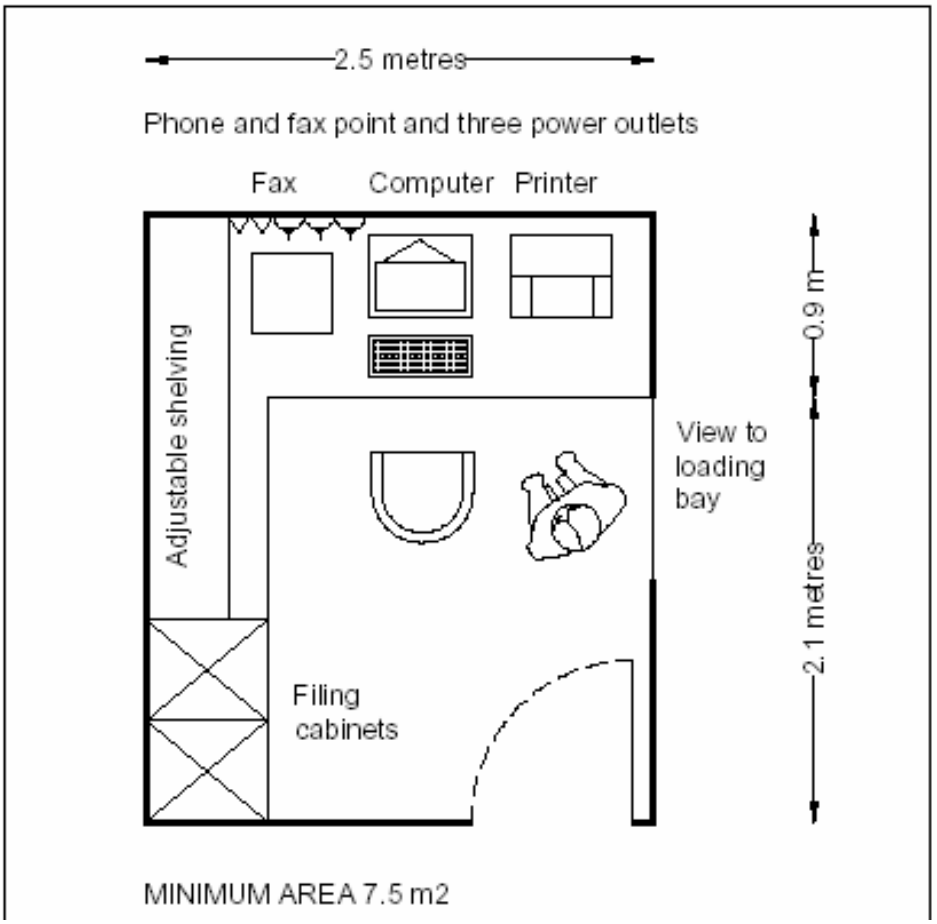


Figure 6: Proposed layout for storekeeper's office

7.7. Packing area

An ”L” shaped zone is available to front and side of the WIF (refer to Figure 3). This space is adequate for icepack conditioning and packing as per WHO-recommended norms (refer to Figure 7) . Utilisation of this space will approximate that recommended in the WHO layout.

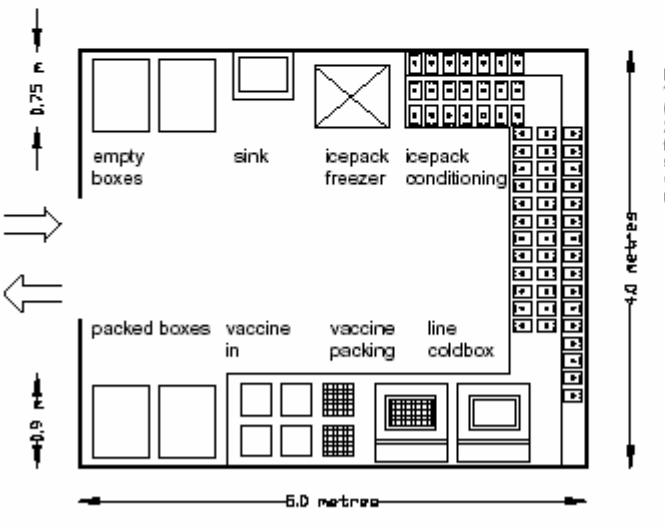


Figure 7: WHO recommended norms for icepack conditioning and packing of vaccine

7.8. WIF

A space of 4.5 m x 3 m has been assigned at Location “A” for assembling the 30 m^3 WIF. It should be assembled 0.6 m away from the rear and side wall so as to permit access for cleaning and assembly purposes. A reinforced concrete plinth, of 6 to 10 cm thickness is proposed to provide a base for the WIF. Positioning of the WIF is indicated in Figure 3.

7.9. Storage of consumables

A space of 3.3 m x 3m is available immediately adjacent to the WIF and packing space. This requires storage shelving and is adequate for storage of diluents and immunisation-related consumables. No other location or facility is available for the storage of supplies except for the large lobby available outside the room.

7.10. Backup generator

A space of 3.5 m x 2.6 m is available to mount a back-up generator (refer to Figure 3). The location has an access door and large grilled apertures on one side of the room. The room size is now being extended by 1 meter as the grilled wall is being extended. There is also adequate space to mount an electrical distribution panel and store maintenance supplies, though shelves need to be built for this. The space is secure and located less than 8m away from the WIF.

7.11. Flow of personnel

The flow of movement of personnel associated with the management, reception and distribution and storage of vaccines at this WIF is shown in the Figure 8 , the proposed layout is comparable to the model proposed in the WHO reference diagram .

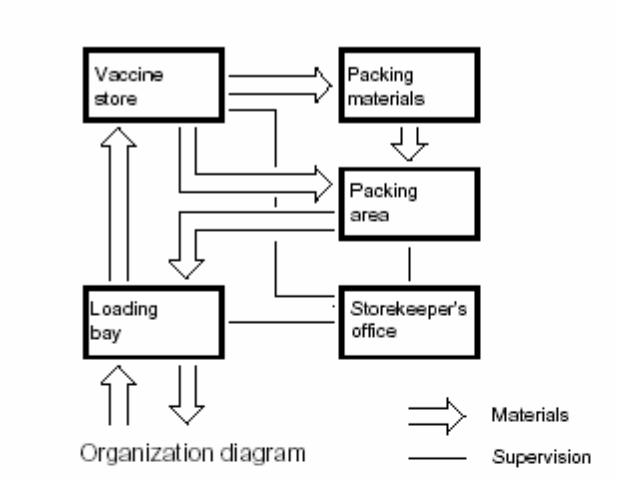


Figure 8: Recommended organisational structure of cold store

8. AVAILABILITY AND QUALITY OF POWER SUPPLY

8.1. Power situation and stability

The quality of the three-phase power supply from the national grid is reported to be less than adequate by Dr. Jain (AAD) and Dr. Vohra (SRC, Meerut) . Voltage fluctuation is too high and power supply is not reliable..

- The new 30m^3 WIF supplied by UNICEF does not have a standby generator.

8.2. Electrical safety

Though the electrical fittings are securely provided with the construction of building, open wiring at distribution panel and fuse bypassing at few ends cause security hazard at the given location. Electricity supply to the proposed cold rooms is sourced from the central power supply board of building. .

8.3. Circuits with correct rating

Electrical circuits for proposed cold rooms are fitted with isolators through switchover devices. Each WIF and WIC is wired internally to the central board of the building

9. CAPABILITIES OF STOREKEEPER AND OTHER STAFF

9.1. Establish extent, type and whether effective training has been carried out

The storekeeper, Mr Anil Kumar, has been handling the store since the last three years. But he has not received any training in handling vaccine and maintaining the cold chain.

The equipment is being maintained by Mr Jai Bhagwan, who is a refrigerator mechanic. He has not received any formal training either. Mr Bhagwan undertakes the routine maintenance of the equipment in terms of defrosting and cleaning. He also carries out the minor electrical repairs to the DFs and ILRs. He is ill-equipped to undertake any major repair work as he does not have the tools to do so. The WIC at the PL Sharma District Hospital is maintained by Blue Star.

The measles vaccine continues to be stored in the DF. The storekeeper states that he has not received any instructions to store the vaccine in the ILR.

9.2. Familiarity with record keeping procedures

The storekeeper maintains separate register for each vaccine. The following details are recorded on the register:

1) Date of shipment (received and dispatched)
2) Sender or receivers name
3) Batch number of vaccine (only incoming vaccine)
4) Quantity in doses
5) Expiry date (only incoming vaccine)

Outgoing vaccine batch number and expiry date is recorded only in indent register which is maintained separately. The registers are kept in a locked cabinet.

Records for diluents are not maintained separately. They are recorded along with the vaccine entry under the assumption that an equal quantity of vaccine dose is supplied. Syringe and dropper records are maintained separately.

9.3. Able to correctly read cold room temperatures

The storekeeper can read the temperature correctly from the thermometer. He knows the temperature zones and storage norms.

Temperature is recorded manually on a regular basis. There is a separate record book of temperature readings (as supplied by UNICEF) for each refrigeration unit. However, temperature record books are not signed by any authority. .

9.4. Familiar with FIFO and FEFO and loading procedures

FIFO is practised and clearly demonstrated in the register. However, incorrect loading practices were observed. Cold boxes are packed with frozen ice-packs and there is lack of awareness regarding ice pack conditioning

9.5. Computer literacy

The storekeeper is not a computer literate. He will require a basic training to handle the computerised inventory of the store.

10. VACCINE FLOW AND COLD CHAIN CAPACITY REQUIRED

The location functions as an intermediate store and supplies vaccine to seven adjacent districts.

Table 1 below indicates the annual flow of vaccine through the store. The flow of vaccine for 2005-2006 reveals that the supply fell short of demand, especially when one considers the

immunisation targets for the year. Table 1 also compares the total vaccine supply and the target for the year (2005-2006)

Table 1: Comparison of target volume of vaccine and actual quantities supplied (2005-2006)

Vaccine	Target volume (in doses)	Actual Quantities (doses)	Gap of supply and target
BCG	1157000	1140000	-17000
OPV (routine)	2823000	3758000	935000
OPV (pulse polio)		12361000	-
Measles	723000	733000	10000
DPT	2823000	1760000	-1063000
DT	1189000	660000	-529000
TT	3200000	1470000	-1730000

For the required storage volume calculation we take the target volume of vaccine as our base. The stated average retention time is three months with some exceptions. Based upon the present data, the WIF can hold more than a year's stock of OPV vaccine (six delivery cycles).

The WIC's storage capacity is close to four months.

The vaccine, as mentioned earlier, is being supplied to seven adjacent districts. **Error! Reference source not found.** shows the population figures of these districts:

Table 2: Population covered under vaccine supplies from the present store

District	CHC	PHC	Population
Meerut	2	10	3500652
Ghaziabad	5	5	3290586
Gautambudh nagar	2	3	1540863
Bulandshahr	5	10	3202098
Baghpath	3	3	1163991
Muzzfarnagar	7	10	3893598
Saharanpur	6	8	3091229
Total	30	49	19683017

Table 3: Annual immunisation targets and storage volume required

Vaccine	Doses per year	Frequency of arrival (in months)	Safety stock (in months)	Storage volume required (m^3)	Transport box volume (m^3)
Freezer room (-25 to -15) Capacity of freezer room 30 m^3					
OPV (20 doses)	2823000	2	3	1.2	7.05
Cold room (+ 2 to +8) Capacity of cold room(new proposed) (30 m^3)					
Measles (5 doses)	733000	2	3	2.1	12.82
BCG (10 doses)	1157000	2	3	1.2	6.94
DPT (10 doses)	2823000	2	3	3.5	10.58
DT (10 doses)	1189000	2	3	1.5	4.46
TT (10 doses)	3200000	2	3	4	12
Total				12.3	46.8

The site presently has operational 3 large DFs, 2 small DFs, 2 large ILRs and 2 small ILRs. All are CFC-free. There are 3 large DFs (CFC) marked "condemned".

11. MAINTENANCE

The annual maintenance of the existing WIC is outsourced to Blue star, New Delhi. The maintenance contract is renewed every year. The maintenance standards are poor and responsiveness to requests for service is slow.

12. RECOMMENDATIONS

12.1. Priority actions not directly linked to installation of the WIF

1) The present Walk-in Cooler (WIC) installed at the district hospital is 20 years old. Though the WIC is operational, it is due for replacement. It is suggested that the old WIC be replaced with a new one with size of 30m³. Since two rooms are available at the proposed site (of similar size, refer to floor plan in annex 1) a new WIC can be installed in the same building. Dr. S K Jain, Asst. Additional Director, confirmed that two rooms can be made available for the WIC and the WIF.

2) Provide and install one, three-phase autostart generator of 30 KVA capacity to ensure backup to the new WIF, refrigeration units (DFs and ILRs) and proposed WIC .

- Power Distribution
  - A new three-phase 50 A electrical line should be drawn from the LT transformer adjacent to the Meerut store. This transformer provides power to the building.

- This line should be drawn directly to a metering and distribution panel mounted near the generator set.
- A generator with the capacity to power ALL WIFs and WICs at the store should be installed.
- New three-phase distribution lines should be drawn from this distribution panel to each WIF and WIC. The panel should also be connected through an autostart to the generating set.

3) Rewire electrical supply, distribution panels and circuit protection arrangement for the entire cold room installations, with appropriate connection to the autostart generator set.
4) Ensure that an Annual Maintenance Contract (AMC) is put in place with a reliable service organisation, to provide a regular preventive maintenance programme for the WIF and WIC and the generator set, and ensure prompt response and quality maintenance services for unscheduled equipment failures.

12.2. Priority actions linked to installation of the WIF

To ensure quality, timely and complete delivery of improvements, the tasks listed below should be contracted on a turnkey arrangement. Each task should be clearly defined; the specifications detailed; and quality assurance provided throughout implementation. The tasks to be included in this contracted arrangement are:

1) Pour a reinforced concrete slab in the form of a raised plinth of 6 to 10 cm thickness at the location where the new WIF is to be located. This raised plinth will reduce the risk of inundation from flooding and corrosion during any floor washing. It is to be noted, however, that the floors seem to be washed rarely.
2) Cover/Close the windows in the wall adjacent to the WIF permanently.
3) Install a washing/cleansing sink water supply system and associated drainage points at the location where the new WIF is to be installed.
4) Install benches for icepack conditioning and packaging .
5) Mount three extractor fans (1500 CFM each) in the existing room where the WIF is to be fitted.
6) Mount two 1.5 tonne air conditioners in the WIF, ice conditioning and packing zone.
7) Install two telecommunication lines and telephone sets.
8) Provide shelves in the storage room adjacent to the WIF.
9) Furnish the storekeeper's office and include a secure location to keep records, a heat pump and an air conditioning unit in the office.
10) Minimise risk of fire by:
    - removal of unused inflammable materials from the premises.
    - improvement of electrical cabling and fault-detection devices (contact breakers)
    - provision of appropriate fire extinguishers at locations adjacent to all generators and cold rooms (CO_2 or powder extinguishers)
11) Install smoke detectors in the vaccine storage areas.
12) Build a hanger along the front of the building housing the WIF.

13) Install two water-resistant electrical sockets on the wall under the hanger.
14) Repaint and tile the walls of Location “A” and location “B” where the WIF and proposed WIC is to be installed.
15) Complete the required electrical work, including a 3-phase dedicated power supply with a manual power cut-off switch for the cold room.

IMAGES FROM PROPOSED SITE

Main Entrance of the room

Furniture stocked up in the room. On right side, one of the two wooden cabinet which can be used to store record books.

View from proposed packing area. Corner visible is proposed location for storage of diluents, syringes and other consumables)

Proposed room for installation of generator for WIF. Facility is well protected and well ventilated.

Packed WIF awaiting for installation

Minor damage to the body of compressor unit.