

Proposed Warehouse Improvement Plan for the Government of Bangladesh, Directorate General of Family Planning

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The goal of the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program is to assure the availability of quality pharmaceutical products and effective pharmaceutical services to achieve desired health outcomes. Toward this end, the SIAPS result areas include improving governance, building capacity for pharmaceutical management and services, addressing information needed for decision-making in the pharmaceutical sector, strengthening financing strategies and mechanisms to improve access to medicines, and increasing quality pharmaceutical services.

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ABBREVIATIONS AND ACRONYMS

DGFP	Directorate General of Family Planning
MoHFW	Ministry of Health and Family Welfare
MSH	Management Sciences for Health
SIAPS	Systems for Improved Access to Pharmaceuticals and Services
SPS	Strengthening Pharmaceutical Systems
UIMS	Upazila Inventory Management System
WIMS	Warehouse Inventory Management System
WIP	Warehouse Improvement Plan

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¹ Linvar Storage Systems; <http://www.linvar.co.za/>

EXECUTIVE SUMMARY

The United States Agency for International development's Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program in Bangladesh, funded by the US Agency for International Development (USAID) and implemented by Management Sciences for Health (MSH), is working toward improving access to and availability of quality pharmaceuticals and effective pharmaceutical services. This activity falls under the main objective of strengthening the supply chain management systems of the Ministry of Health and Family Welfare (MoHFW) and component procurement entities with a particular focus on strengthening the logistics and supply chain management systems of the warehousing systems of the Directorate General of Family Planning (DGFP). This assignment focuses on further gains for effective and efficient warehousing and distribution system.

Although the assignment focused on the assessment of the warehouse conditions, facilities, and systems for the central warehouse and three regional warehouses of Chittagong, Khulna, and Tangail, Ghior, Sadar, Shaturia, Boalkhali, and Rupsha were also assessed because they represent a cross section of the more than 200 smaller storage facilities.

The warehouses have been operating with minimum structures in the absence of floor plans, adequate shelving, and handling equipment. Consequently, the Warehouse Inventory Management System (WIMS) has not been challenged. The roadmap recommends that these processes advancing increased use of WIMS be reactivated as phase 5, the last of the planned implementation phases for the Warehouse Improvement Plan (WIP).

The key tool for the WIP is a detailed floor plan for every warehouse and storeroom under review. A detailed floor plan has been prepared following the visits to the facilities indicated.

To facilitate an all-inclusive decision-making process, SIAPS created a comprehensive equipment catalogue for shelving and handling supported with specifications that will assist clarity and fair competition during the procurement process.

The concept of boltless shelving has been introduced. This is an industrial bulk shelving system; a departure from the traditional bolted or welded steel shelving. The assembly process requires minimum hardware. It is easy to assemble and just as easy to disassemble and provides much-needed flexibility during use.

Road Map

Phase 1 deliverables for this assignment—

- Design floor plans, 11
- Design lighting plans
- Design catalogue
- Identify and select shelving

- Identify and select handling equipment
- Identify and select safety and protective wear
- Prepare specifications to assist procurement
- Highlight required infrastructure repairs and improvements
- Assess temperature control facilities
- Assess WIMS use and opportunities for integration with Upazila Inventory Management System (UIMS) and web-based software
- Provide a roadmap and a basis for increased partnership through clear allocation of roles and responsibilities between the DGFP and SIAPS

Phase 2—next 3 to 5 weeks

- Assist procurement with requests for clarifications

Phase 3—next 5 to 10 weeks

- Supplier inspection: validate supplier capacity, quality, and product availability of selected shelving and handling equipment as detailed herein

Phase 4—next 10 to 30 weeks

- Prepare temporary storage for all shelving and equipment
- Prepare all warehouse floors for installation while ensuring continued operations
- Supervise installation
- Supervise product allocation and use of new shelving

Phase 5—next 30 to 35 weeks

- Implement increased WIMS functions for warehouse management and inventory control

Quick Wins—next 4 to 10 weeks

DGFP and SIAPS partnership is strengthened through ownership of roles and responsibilities to enable visible and practical results in the next four months.

DGFP roles and responsibilities are defined for further implementation of the WIP—

- Disposal of all old vehicles, irreparable handling equipment, old pallets, expired drugs and medical supplies
- Preparation of temporary storage and assembly space for new shelving and handling equipment
- Change to more compliant storage and handling of oxygen

- Distribute excess stationery and intravenous stands from central warehouse and rationalize future stationery procurements
- Devise a vendor compliance program that defines agreed delivery schedules in line with demand and distribution throughput

SIAPS roles and responsibilities—

- Procure and install shelving
- Procure and install lighting plan
- Procure and distribute handling equipment to reduce workload
- Procure and install signage to promote safety
- Procure and distribute protective wear to promote safety and staff welfare
- Procure and install overhead fans
- Procure and install extractor fans
- Procure and install air conditioners
- Improve office layouts, furniture for improved working conditions

Table 1: Summary of Recommendations

Sequence	Focus	Recommendation	Ownership
		Dispose of—	
	Disposal	<ul style="list-style-type: none"> • All old vehicles • Expired medicines and medical supplies • Irreparable handling equipment • Old pallets • Old tires 	DGFP
		Distribute as much required stationery to facilities as possible	DGFP
		Distribute all medical equipment, IV stands, etc.	
Short term	Improved space use; excess stationery and equipment	Review current supplier delivery practices to reduce congestion	DGFP/MSH
		Review quantification and procurement of stationery	
		Decide on future use for the garage space at Central Warehouse	DGFP
	Oxygen storage and handling	Immediately change current practices by implementing consultant's guidelines on safe handling	DGFP
	Warehouse housekeeping	Dust all storage spaces; mop and scrub floors	DGFP
		Paint warehouse interiors and exteriors	DGFP/MSH

Proposed Warehouse Improvement Plan for the Government of Bangladesh, DGFP

Sequence	Focus	Recommendation	Ownership
Medium term	Backup power	Consider solar or diesel generator backup	DGFP/MSH
		Review and fill staff vacancies, cleaners, loaders etc.	DGFP
	Software	Expand web-based software coverage	MSH
		Accelerate upgrade and review integration opportunities	
	WIMS	Standardize all product codes in all facilities	DGFP/MSH
		Remove all inactive items in the WIMS	
		Activate as many functions as possible following the installation of shelving and implementation of recommended inventory practices	
		Improve report functions to include ABC analysis for both consumption and expenditure	
	Shelving installation preparation	Draw shelf positions in all improving warehouses and stores	Consultant/TAs/DGFP
		Shelving	
	Handling equipment; reduced workload	Procure and install	MSH/consultant
		Procure and distribute	
	Warehouse lighting	Procure and install to consultant's lighting plans	DGFP/MSH
		Improve natural lighting through the roof	
	Warehouse identification	Procure and install signage	MSH/consultant
Staff welfare and safety	Procure and allocate protective wear	MSH/DGFP	
	Procure and allocate new furniture		
	Renovate and improve office space and temperature		
Long term	Warehouse expansion	Following implementation of review warehouse improvement plans, throughput velocity, receipt, storage, fulfillment, and dispatch functions	DGFP/MSH/consultant
		Review WIMS capacity and consider integration or switch to new software	MSH/consultant
	Systems improvements	Integrate web-based with WIMS	MSH / DGFP

BACKGROUND

Bangladesh Ministry of Health and Family Welfare (MOHFW)'s, Directorate General of Family Planning (DGFP) is responsible for providing reproductive health/family planning services and products. With the increased volume of commodities, as a result of strengthened procurement and bulk delivery of commodities to the central warehouse in recent years, there is a need for a well-designed plan to improve warehousing and distribution.

The United States Agency for International Development's Systems for Improved Access to Pharmaceuticals and Services (USAID/SIAPS), managed by Management Sciences for Health (MSH), is supporting DGFP to improve procurement and supply management of family planning in Bangladesh. In collaboration with SIAPS, the MOHFW identified a need to review the national warehouse management system and recommend improvements in the following areas:

- Cost effectiveness of storage of family planning commodities- assessment of the DGFP storage space and removal of obsolete products (medicines, supplies, equipment, stationeries and other hospital accessories), as well as risks associated with these products.
- Commodity and warehouse staff safety – a good warehouse and distribution process address the importance of effective storage management and warehousing for the safety of medicines and warehouse staff (concerning staff movement within the warehouses). SIAPS assesses and addresses any safety issues relating to the DGFP warehouse as far as good logistics management is concerned.
- Compliance with regulatory requirements – present a well-documented DGFP report and situational analysis that addresses all storage requirements; situation, strengths, gaps and possible ways to meet all regulatory standards for a good logistics management of family planning commodities
- Clients satisfaction – a good warehousing system improves client satisfaction by providing timely stock updates, maintaining quality of medicines and timely delivery due to good logistics management systems
- Technology synchronization – DGFP has been very successful in implementing the Upazila Information and Warehouse Management Systems (WMS); in addition the Supply Chain Information Portal (SCIP) has demonstrated that DGFP can rely on modern technology to improve family planning logistics management. The assessment will help in preparing DGFP to synchronize the UIMS, WMS and the warehouses business processes e.g. ERP, and vehicles management systems to improve DGFP performance
- Managing workload – a good warehouse management system reduces unnecessary workload
- Optimization of distribution

- Wastages reduction – there is a risk of expiries in a highly congested and poorly designed warehouse, because some of the newly received products may be wrongly placed and get mixed up with expired products.

METHODOLOGY AND PROPOSED APPROACH

The assessment of warehousing conditions was conducted across facilities in Chittagong, Khulna, Tangail, Ghior, Sadar, Shaturia, Boalkhali, and Rupsha. This sample of facilities was selected in order to represent a cross section of over 200 storage facilities in Bangladesh.

The tools used for implementing the Warehouse Improvement Plan (WIP) are the detailed floor plans for warehouses and storerooms reviewed. The assessment included review of warehousing structures, shelving, and handling of equipment at the sites.

Implementing the Warehouse Improvement Plan

The WIP requires a clear understanding of responsibilities. Complete delivery of services is achieved after shelving and handling equipment are in use in line with the inventory control disciplines introduced by the floor plans, such as use of warehouse identification marks, aisles, placement of fire-fighting equipment, etc. Full implementation of the WIP requires the following action—

Phase 1

- Assess warehousing and systems through site visits and consultations
- Design floor plans
- Design lighting plans
- Identify and select shelving
- Identify and select handling equipment promoting reduced workload
- Identify and select protective equipment promoting safety and hygiene and therefore improved staff welfare
- Design shelving and handling equipment catalogue to suit the Bangladesh environment and thus facilitating easy comprehension of the proposal by all stakeholders
- Prepare specifications
- Prepare procurement guidelines
- Prepare a roadmap and quick wins for next six months

Phase 2

- Assist the procurement team with requests for clarifications from bidders

Phase 3

- Validate supplier capacity and quality of selected shelving and handling equipment by visiting the selected suppliers (see below)

Phase 4

- Procure installation consumables: yellow reflective paint, brushes, chalk strings, tapes, markers, A4, five sheet boards for bay marking, glues, etc.
- Map out floor plans on warehouse floors in preparation for installation
- Assist in inspection and acceptance of supplied shelving and handling equipment during delivery to DGFP and MSH
- Supervise installation of shelving
- Implement the floor plan and strengthening of management reports

An All-Inclusive Selection Process: Custom DGFP Catalogue

Based on warehouse visits, the consultant prepared a DGFP custom catalogue supported with pictures for easy comprehension; identification; appreciation of the intended use; and encouraging fair participation in the decision making by all stakeholders. The catalogue was distributed to all technical advisers and presented to warehouse staff during site visits. The catalogue covers boltless shelving and racking; fencing; mezzanine floors; conveyor systems; trolleys; ladders; pallets; lifting equipment; work benches; cleaning equipment; safety equipment; office equipment; and temperature control equipment. The catalogue also provides an opportunity for easy prioritization in the event of insufficient funding.

The Concept of Boltless and Adjustable Shelving

Boltless shelving consists of the rails and upright posts and the unique “buttons” on the shelf rails that snap directly into the postholes. Boltless shelving is a general-purpose storage solution for all kinds of products and environments. This industrial bulk shelving system is a departure from the traditional bolted or welded steel shelving. The assembling process requires minimum hardware. It is easy to assemble and just as easy to disassemble and provides flexibility during use.

This proposal features two types of boltless shelving: long-span boltless shelving and regular boltless shelving. Long span is a little more ragged and offers higher weight capacities and longer span shelves. The regular boltless shelving is usually shorter and designed to support lower capacities but remains a better choice over the traditional welded or bolted shelving.

The DGFP warehousing environment requires an improvement plan that functions with this shelving model. During the procurement of equipment process, bidders should provide full specifications of the materials tendered.



Uprights, consisting of full end frames, uprights, diagonals, and horizontals, bolt-on feet, and all nuts and bolts required to build end frames.

Figure 1: The frame: two uprights and reinforcements



Specifications:

- Length: 3,000mm
- Load: 2,000kg
- Heavy duty

Note clips, boltless

Figure 2: The beams



Specifications

- 50mm pine
- 1,320mm x 1,000mm x 50mm
- Self-locking

Figure 3: The deck



Specifications
Height: 500mm

Figure 4: Frame protectors



Specifications
• Length: 210 mm
• Height: 50 mm

Figure 5: Pedestrian safety, racking barriers

Warehouse Improvement Implementation Lessons

Many assessments have recommended the critical need for practical delivery of visible results. Based on practical experiences of similar projects in the past two years, reference is made to lessons learned in key areas of planning and implementation:

- Important to implement a comprehensive management approach; from design to use.
- Important to own/manage the designs
- Improve process of projecting budgets
- Improve warehouse layouts
- Improve floor plans
- Select correct shelving options
- Select correct handling equipment
- Ensure supplier and equipment inspection
- Ensure adequate preparations for delivery of shelving and equipment
- Increase and improve supervision

- Increase and improve consultations
- Ensure regular stakeholder updates

Floor Plans

SIAPS prepared 11 warehouse floor plans taking into account as many challenges as possible and contributions from stakeholders. This report covers the Central, Chittagong, Boalkhali, Khulna, Ruspha, Ghair, Shaturia, Tangail, and Sadar Tangail warehouse and storerooms. The floor plans are the foundation and basis for all aspects of the suggested improvements: space use, shelving selection, handling equipment selection, temperature control, product allocation, computerization, etc. The floor plans are also the basis for the procurement of all shelving. All floor plans must be included in the bidding documents. Changes should not be made without the consultation of supervisors and stakeholders; further emphasizing the importance of ownership and installation supervision. All floor plans are attached as appendixes.

Procurement

Specifications

The procurement team is encouraged to extract from this report specifications for all approved shelving and handling equipment for inclusion in the bidding document to facilitate clarity. Every effort has been made not to advance any specific brand names or suppliers.

Request for Clarification

The proposal is a combination of multiple factors. Requests for clarification must all be in writing. All clarifications must be shared with all bidders to ensure fair competition.

Shelving and Equipment Validation

Despite the best care taken in the selection process, a small team should visit the source of supply to ensure a perfect match to specifications and quality of materials used. This visit also provides an opportunity for assessment of supplier capacity and assurances regarding product availability. The market is known to attempt to pass off reconditioned equipment for new. Because of the magnitude of this project, leaving inspection and validation for receipt of delivery should not be risked. Official catalogue manufacturers' codes must be confirmed and quoted in all documentation. The directorate and procurement team may also wish to take advantage of experience acquired during the recent procurement of 3-ton pallet lift jacks and air conditioners. The inspection team should consist of a representative from MSH, a representative of the DGFP, and the project consultant.

Warranty

At minimum all equipment should be supported by a one-year warranty.

Shelving and Handling Equipment Delivery, Handling, and Storage

Once the approvals to procure are given, the consultant should work with DGFP and MSH to develop a phased delivery plan. The volumes expected will otherwise overwhelm the limited existing temporary storage space, leading to possible damage before shelving is installed. The consultant has identified all garages and warehouse-covered spaces as the only facility for temporary storage and assembly of equipment. In preparation, it is critical that all old vehicles, tires, irreparable handling equipment, and old pallets be disposed of. Installation must ensure continued logistics operations during the project implementation.

Installation and Supervision

The procurement process should include the cost of installation by the supplying vendor. This process gives the supplier an opportunity to ensure that the intended use is in line with capacities of the equipment, further validating the warranty. Compliance with floor plans is ensured through the consultant's supervision of the installation. Shelving can be installed in all four warehouses within three months from the date of equipment delivery as long as full support from local staff is assured.

CONSOLIDATED OBSERVATIONS: CENTRAL WAREHOUSE, CHITTAGONG, KHULNA, AND TANGAIL

When a warehouse is over capacity, costs are rising, service levels struggling, the layout and lighting poor, and handling equipment inadequate, it is natural to assume that a larger and better planned warehouse will go a long way to solve the issues. In many ways, this is the case with the central warehouse. The demand has exceeded available space. However, the approach needs to examine root causes and establish both short- and long-term solutions.

Short-Term Recommendations

The most immediate need is to deal with some primary causes of the present status and develop an immediate action plan for the reduction or elimination of high-risk items, disposal, warehouse and storage space reconfiguration, additional shelving identification and selection, additional handling equipment identification and selection, and product throughput from suppliers.

High-Risk Reduction or Elimination

Oxygen cylinders are the highest risk to the entire central warehouse. Their handling and storage practices are below required compliance levels. The existing stocks have the capability to destroy every available asset, including staff lives in the event of an explosion.

At a minimum, the following checklist should provide easy-to-apply guidelines—

- Oxygen cylinders should be stored in a cool place, away from heating sources.
- Cylinders should be stored in a stable and upright position. Their weight can cause damage when they fall on staff or stock.
- Place a large “No Smoking” sign in the general vicinity of the oxygen cylinders and alert staff to ensure that no one smokes or lights a flame of any sort near the storage area.
- Ensure ample ventilation. Current space has very limited airflow and can be prone to catching fire if any oxygen vents from the cylinders.
- The cylinders should not be stored near oil, grease, or other flammable liquids.

Ideally, oxygen should not be stored at the central warehouse. Negotiations are necessary for a new distribution plan with the supplier to transfer all the noted risks to the supplier. A direct delivery program should be considered in which the supplier makes scheduled visits to facilities and replaces only empty cylinders, adhering to minimum stock levels. This system would ensure demand-driven supply, thereby reducing related risks and providing the much needed additional storage space.

Housekeeping

- Dust and or wash all storage spaces: shelves, cartons, and walls.
- Mop, scrub, and polish floors.
- Paint walls (light cream recommended).

Disposal

Development plans require immediate disposal of the following—

- Redundant stock—old UNICEF donations
- Expired stock
- Old vehicles
- Old tires
- irreparable handling equipment

Distribution

- Allocate and distribute all new medical equipment (IV stands, etc.).
- Allocate and distribute as much stationery as possible.

Improve Space Use

Warehouse and storage space reconfiguration—

- Prepare a new floor plan for shelving to cover all storage spaces: main warehouse, repackaging, and garage.
- Prepare a new lighting plan covering all aisles, receiving areas, and dispatch areas.
- Consider sky-lighting for more natural light.

Identify and Select Additional Shelving

- Evaluate, quantify, and select appropriate heavy-duty shelving—uprights, beams, decks, guards—promoting vertical storage to safely maximize available space.
- Provide detailed specifications to aid the procurement process.
- Provide an estimated budget.
- Recommend procurement guidelines to ensure value for money.

Reduce Workload: Identify and Select Additional Handling Equipment

- Evaluate, select, and quantify appropriate heavy-duty handling equipment: pallets, turntable trolleys, rocker trolleys, eight step ladders, 2.5-ton pallet jacks, heavy-duty packing and wrapping benches, strapping machines, tape dispensers, warehouse scrubber/polishers, manual sweepers, industrial mops, staff support equipment, etc.
- Provide detailed specifications to aid the procurement process.
- Recommend procurement guidelines to ensure value for money.
- Prepare an estimated budget for resource assessment.

Improve Delivery Practices

Take full advantage of the buying power of the DGFP and ensure refined contracts, which work with a demand-driven phased delivery plan with all suppliers. Current practices imply very weak purchaser and supplier agreements.

A vendor compliance program is urgently needed that defines detailed expectations and specifications required. The program should include corrective processes to be used and consequences for noncompliance. The processes begin at the warehouse's receiving door; every function, from put-away to shipping, is affected in some way by vendors' actions.

Infrastructure

Create and implement warehouse preventive maintenance plans. Khulna's floor is sinking; Chittagong's office front and walls are sinking and cracking; Shaturia's walls are cracking; office space needs remodeling and furniture needs to be replaced. All structures require a fresh coat of paint and major floor repairs to the Central Warehouse, Khulna, and Chittagong.

Medium-Term Recommendations

- Upgrade or consider a more current software system.
- Procure and install shelving.
- Procure and install overhead fans.
- Procure and install extractor fans.
- Procure and distribute handling equipment.
- Procure and install warehouse lighting.
- Reintroduce bin location for easy identification of stock and improved picking practices.
- Reintroduce identification signage, bay labels, bin locations, etc.
- Mark all access areas with yellow industrial reflective paint.

Long-Term Recommendations

Facilities

The current warehousing, office, and staff welfare facilities are overwhelmed and therefore no longer in line with the concept of central warehousing in the case of the Central Warehouse. The available total space requires careful analysis for long-term expansion plans to optimize site potential. The design methodology should begin with a review of the existing operations and the gathering of transactional data for growth in inventory, throughput velocity, receipt, storage, fulfillment, dispatch, and costs incurred in the process. This is the premise for a sanity check presenting an opportunity for benchmarking against industry standards.

The expert integrated and holistic approach should take into account the following goals, technical requirements, and constraints—

- Capital
- Information technology systems
- Timing
- Site / building
- Temporary logistics
- Cost-effectiveness
- Accessibility and location—a key driver
- Functional operations: receiving, storage, shipping, aisle spaces, relevant handling equipment, picking, packing, temperature control, energy-efficient lighting, fleet management, staff welfare, office space
- Security
- Safety: upright and bay guards
- Sustainability: appropriate ventilation
- Space requirements based on improved links between procurement and logistics, reflecting planned and controlled deliveries in proportion to dispatched volumes

Software Review

The web-based logistics management information system has achieved great success and truly presents an increased level of information access for monitoring and evaluation as well as decision making at all levels. The planned rollout intended to achieve total coverage in the next 12 months should deserve further celebration. However, the silent challenge remains the balance of items not included in reports. Work plans for the immediate future should address this gap.

Although the WIMS has been in operation for more than 10 years, no real opportunity was created to test its potential. The warehouse layouts and design have operated at the most basic level without full application of inventory management practices for receiving, bin management,

pending management, inventory allocation, picking management, capturing of batch numbers and expiry dates, etc. In the absence of full function activation, the capacity for a broader range of management reports has not been possible.

The entire inventory management system has operated without any attempt to manage stockholding costs. Accounts payable, accounts receivable, customer relationship management, hold management, order fulfillment, and vendor management modules are dormant. All advantages of bar-coding technology are not part of the operations.

Further assessment should therefore await implementation of the WIP. A full activation of WIMS functions should be implemented immediately thereafter. This will create the premises for software upgrade or replacement. The logic in integrating WIMS and UIMS should be further explored at this stage.

SHELVING AND RACKING

Shelving and rack options are the centerpiece of any warehouse. Four options are available: pallet racking; drive-in racking; light-duty racking; and decked racking.

Pallet Racking

This option provides heavy loading capacity, sometimes as high as 4,500kilograms per level. It is one of the most widely used systems, universal and reliable, but it relies entirely on safe, mechanically sound forklifts, stackers, and other material-handling equipment. The spare parts are simple and cost-effective. The racking is easy to install and uninstall because most components work on the boltless approach. Although in use at the central warehouse and no accidents have been reported in the last four years, additional safety assurances mean that decks should now be included in the improvement plan. This should be considered option 2 of 4.

Drive-in Racking

This option is mostly used for temperature-sensitive products and heavily relies on the use of mechanized handling equipment. This is proposed as option 4 of 4.

Light-to-Medium-Duty Racking

Light-duty racking safely supports between 1,000 and 4,000 kilograms per bay. This shelf load would fit the requirements of smaller storage facilities and is proposed for facilities such as Boalkhali and Shaturia. The focus in this report, however, is on larger and heavy-duty storage warehouses. This should be considered option 3 of 4.

Decked Racking

The advantages of decked racking include easy drop-in installation and easy removal. It provides a secure self-locking shelf for all methods of loading: manual, forklift, or stackers. The heavy-duty bays support up to 8,000 kilograms per bay. This is the proposed choice for the central warehouse, Chittagong, Khulna, Tangail, and similar-sized DGFP warehouses.



Figure 6: Racking options

Wooden Decks



Figure7: Wooden deck

Specifications

- Size: 1,320 mm x 1,000 mm x 50mm wood
- Shelf load / strength: to support minimum 1,000-kg load
- Fit: self-locking flash over beams
- Wood: supplier to specify available range

Galvanized Steel Decks

They are easy to clean, rustproof, and mothproof.



- Specifications
- Size: 1,320 mm x 1,000 mm
 - Shelf load / strength: to support minimum 1,000-kg load
 - Fit: flared over beam

Figure 8: Steel deck

Steel Wire Mesh Decks

They are easily drop-in installed; offer better illumination of products; decrease fire hazard (preference over wooden decks) and thus may reduce insurance rates; and are low maintenance, economical, durable, sanitary, self-cleaning by allowing dirt and dust to fall through the open mesh. This is the recommended choice for BGFP warehouse decks.



- Specifications:
- Size: 1,320 mm x 1,000 mm
 - Grid: 50 mm x 100 mm x 4 Ga
 - Shelf load/strength to support minimum 1,000-kg load
 - Fit: flared 50 mm

Figure 9: Steel wire mesh decks

HANDLING EQUIPMENT: TROLLEYS, LADDERS, PALLETS, LIFTING, PACKAGING

Trolleys

Multipurpose trolleys are recommended for awkward, bulky, or heavy loads for all warehouses.



Figure 10: Multipurpose trolleys



Specifications

- 1,000 L x 610 W x 1,050 H
- 250-kg weight capacity
- Standard enamel painted in blue or gray
- 100 mm heavy-duty casters, two fixed and two swivel

Figure 11: Picking trolley, two shelves, for district and Upazila



Specifications

- 1,000 L x 610 W x 1,050 H
- 250-kg weight capacity
- Standard enamel painted in blue or gray
- 100-mm heavy-duty casters, two fixed and two swivel

Figure 12: Picking trolley, three shelves, regional, district, and Upazila levels



Specifications

- 300-kg loading capacity
- Two fixed and two swivel casters
- 1,200L x 690W

These are ideal for district level.

Figure 13: Galvanized platform trolleys



Specifications

- 900-kg loading capacity
- Two fixed and four swivel casters
- 1,500 H x 610 W
- Galvanized

These are most flexible and recommended for central and regional warehouses.

Figure 14: Rocker trolley



Specifications

- 900-kg load capacity
- 1,500 H x 760 W
- Galvanized finish
- 350-mm diameter solid rubber wheels

Recommended for central and regional warehouses.

Figure 15: Turntable trolley

Ladders

Industrial ladders have multiple uses. Central and regional warehouses should have them.



Specifications

- Capacity: 150 kg
- 10 steps
- Wide nonslip steps
- Aluminum
- Full length: 2.92 m

Figure 16: Industrial ladders

Platform ladders are recommended for central and regional warehouses.

Specifications

- 10 steps
- Top step height: 2,560 mm
- Overall height: 3,290 mm
- 2 x 100 mm lockable casters (kick brakes)
- 2 x 100 mm fixed casters
- Safety bar and hand rail
- L x W base dimensions: 1,865 x 1,140 mm
- Nonslip treads

Specifications

- Six steps
- Top step height: ,1570 mm
- Overall height: 2,170 mm
- 2 x 100 mm lockable casters (kick brakes)
- 2 x 100 mm fixed casters
- Safety bar and hand rail
- L x W base dimensions: 1,250 x 960 mm
- Nonslip treads



Figure 17: Platform ladder

Pallets

Wooden pallets are high maintenance; they require gentle handling. Their life span is shortened by exposure to water and humidity. They are not recommended.



Specifications

- 25 mm pine
- Slatted top
- 1,000-kg loading capacity
- 1,200 mm × 1,000 mm × 185 mm
- Four-way entry

Figure 18: Wooden pallets

Plastic pallets are low maintenance, washable, light, and cheaper than steel pallets. They are recommended because of their manageable handling weight, easy care, and safety.



Specifications

- Size: 1,200 mm x 1,000 mm x 150 mm
- Weight: 12 kg
- Four-way entry
- Dynamic load: 1 ton

Figure 19: Plastic pallets

Steel pallets are durable and long lasting and they can be repaired, but they are expensive. They are also heavy and pose a risk to foot injury and are therefore not recommended.



Specifications

- 1,000-kg loading capacity
- Four-way entry
- 27.5-kg weight
- Seven steel slats

Figure 20: Steel pallets

Lifting



Specifications

- 3-ton capacity
- Polyurethane double bogie wheels
- Maximum lift height of 200mm
- Sizes: 1,200 mm Lx 680 mm W; 1,200 mm L x 520 mm W
- One-year guarantee

Figure 21: Pallet truck



Specifications
Combination lift table and pallet jack
Capacity: 1,000 kg
Maximum lifting height 800 mm
Sizes: 1,200 mm Lx 680 mm W; 1,200 mm Lx 520 mm W

Figure 22: High-lift pallet jack

High-lift pallet jacks reduce back injuries and are recommended equipment.



Specifications

- 3500-mm lifting height
- 1,500-kg lifting capacity
- Controlled lifting and lowering
- Small turning radius
- Compact design, lo net weight
- Built-in compact power pack/battery and charger
- One-year guarantee

Figure 23: Electric stacker

Electric stackers are recommended for central and regional warehouses.

Packaging

Heavy-duty packing and wrapping benches are recommended equipment because they have the following benefits—

- Create maximum packing tables and benches storage space
- Maximize floor space
- Increase efficiency
- Raise worker morale by keeping backs healthier



Specifications

Above and below packing tables and bench components should be added or removed as required.

- Adjustable in height from 29 to 36 inches
- All components adjustable to accommodate the worker
- All sheet metal components 14–16 gauge steel
- Packing tables support up to 500 kg
- Rounded edges with inlaid t-molded vinyl edges for protection
- Highest quality tops

Figure 24: Heavy-duty packing and wrapping benches



Specifications

- Strap size: 12.5 mm
- Strap type: all plastic
- Application: single-feed high joint strength
- Shipping weight: 9 lbs.

Recommended for all facilities

Figure 25: Plastic strapping machine



Specifications

- 48 mm tape width
- 72 mm tape width

Recommended for all facilities

Figure 26: Tape dispenser

SAFETY, HEALTH, AND STAFF WELFARE

Cleaning



Specifications

- 3 × two-stage motors
- 3,600 watts 8 L tank
- 160 L/sec airflow
- 2 × two-stage motors
- 2,400 watts 70 L tank
- 100 L/sec airflow

Recommended for central and regional warehouses

Figure 27: Industrial vacuums and accessories



Specifications

- Brush and pad size:425mm
- Weight: 32kg
- Speed: 300 rpm
- Ideal for all hard floors
- Must include pad drive

Recommended for central and regional warehouses

Figure 28: Warehouse polisher and scrubber



Specifications

- With side brush: 670mm
- Without side brush: 480mm
- Hopper capacity: 40 L
- Weight: 24kg

Recommended for central and regional warehouses

Figure 29: Manual sweeper



Specifications

- Yellow
- Plastic
- 11 W x 1.5 D x 25 H

Recommended for all facilities

Figure 30: Rubbermaid safety floor sign



Specifications

- 120-L waste bag and lid
- 2 x 22 L buckets
- 4 x 5 L buckets (red/blue/green/yellow)
- 2 x full trays
- Dual all-mop press
- 1 x 400 g local mop head
- Single aluminum handle

Figure 31: Warehouse cleaning mops



Specifications

- Stainless steel
- ABS hang drier
- 2,500 / 1,650 watts
- One-year guarantee

Figure 32: Hand drier



Specifications

- 1.2-L soap dispenser
- Stainless steel
- Lockable

Figure 33: Soap dispenser



Specifications

- Pump pressure 120 bar
- Water flow: 7.3 L min/max
- Cleaning power: 1.7 kw
- Weight: 15.5 kg
- Includes hose reel

Recommended for central and regional warehouses

Figure 34: High-pressure cleaners



Figure 35: Refuse container

Specifications

- 1,000-L bin
- Two free-wheeling casters and two casters with brakes
- Capacity: 300 kg
- Size: 1,260 × 1,305 × 772 mm
- Can supply in black, gray, or green

Recommended for central and regional warehouses

Safety



Figure 36: Refrigerator

Specifications

- Capacity: 13 cu. ft.
- Energy rating: A+
- Auto-defrost
- Five shelves



Specification

- 9-kg dry chemical extinguisher

Recommended for all facilities

Figure 37: Fire extinguisher



Specification

- 5-kg water and foam extinguisher

Recommended for all facilities

Figure 38: Water and foam extinguisher



Specifications

- Size: 150x 150mm
- 0.9-mm thick ABS double-sided foam
- Good scratch resistance and hardness

Figure 39: Safety signage

Protective Wear



Specifications: Consider sourcing locally

- A = Pigskin candy stripe 5 cm
- B = Reinforced chrome leather 5 cm
- C = Reinforced chrome leather 20 cm
- D = Candy stripe chrome leather
- E = Green-lined leather welder 5 cm
- F = Green-lined leather welder 10 cm
- G = Red-lined leather heat 20 cm
- H = Crinkle black rubber 20 cm

Figure 40: Hand protection wear



Specifications

To be ascertained after final selection
Consider sourcing locally

Figure 41: Foot protection wear



Specifications

To be ascertained after selections
Consider sourcing locally

Figure 42: Protective clothing

ECONO BIB



EN4 WAISTCOAT



TWO-TONE WAISTCOAT WITH SLEEVES



TWO-TONE WAISTCOAT



Specifications subject to final selection

Figure 43: High-visibility wear



Specifications

- Size: 1,800 H x 410 W x 430 D mm
- Single
- Galvanized steel
- Gray
- With money box and shelf

Figure 44: Industrial locker

Other



Specifications

- Five shelves
- 1,800 H x 1,200 W x 600 D mm
- Lockable casters
- Galvanized steel

Figure 45: Steel lockable cabinet



Specifications

- Bench scale
- Size: 1,200 mm x 1,000 mm
- 1,000-kg capacity
- Digital Reading
- Rechargeable batteries

Figure 46: Industrial scales



Specifications
Dimensions to match beam sizes –
heavy and medium

Figure 49: Bin location label holders



Specifications

- 18oz nylon reinforced vinyl curtain
- Industrial grade, light cream
- With installation kit

Figure 50: Temperature control strip door kit

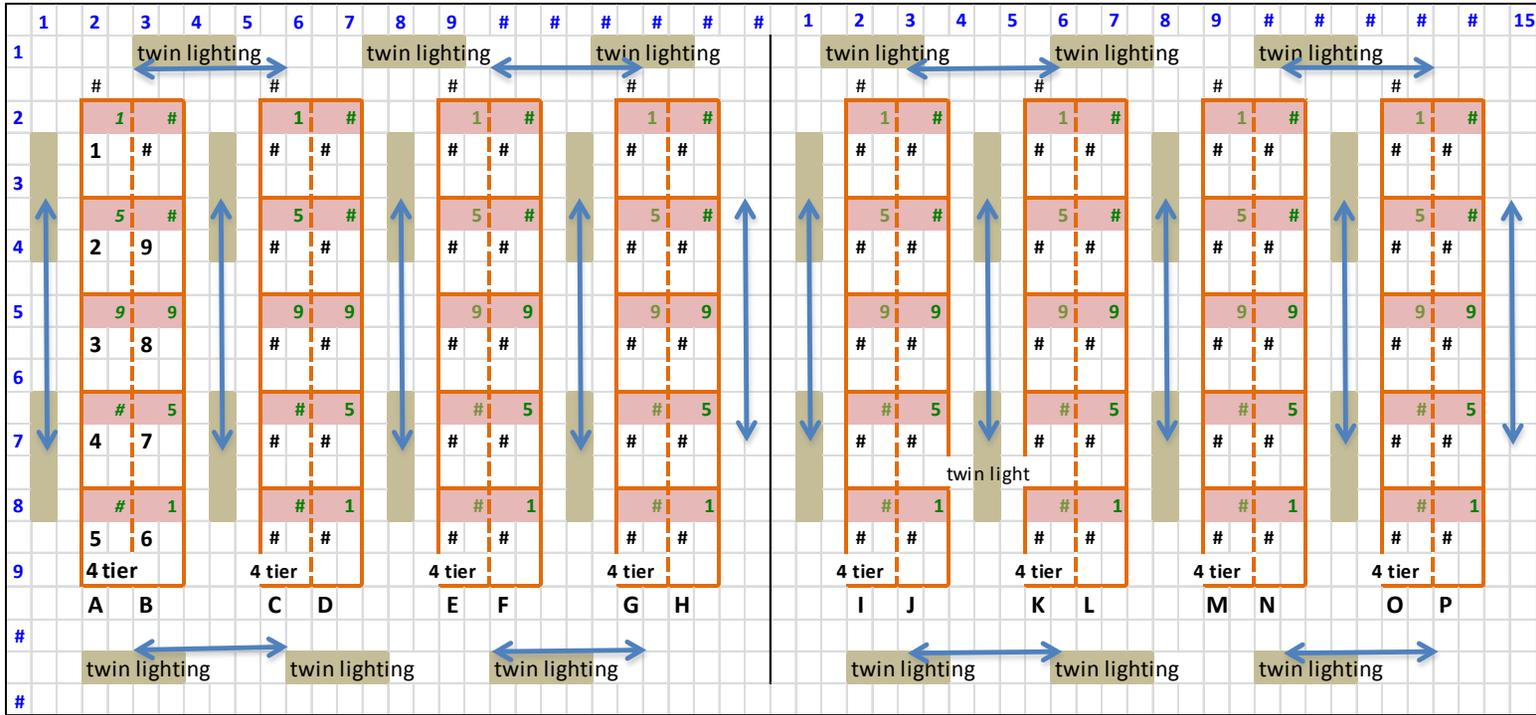
CONCLUSION

This comprehensive review has identified gaps and recommended short, medium, and long term interventions to address the gaps. The recommended floor plans will help optimize the warehouse design; thereby improving storage space and product safety. The recommended types, specifications and quantities of shelving and handling equipment will inform and rationalize the selection and procurement of the equipment. The specifications and pictures included in the catalogue will ensure common interpretation and understanding of the recommended warehousing equipment and handling materials. Implementation of these warehouse improvement recommendations is expected to improve the efficiency and effectiveness of the national supply chain logistics management system, and thereby increasing availability and access to RH/FP commodities in Bangladesh.

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APPENDIX A3: FLOOR PLAN FOR CENTRAL WAREHOUSE GARAGE

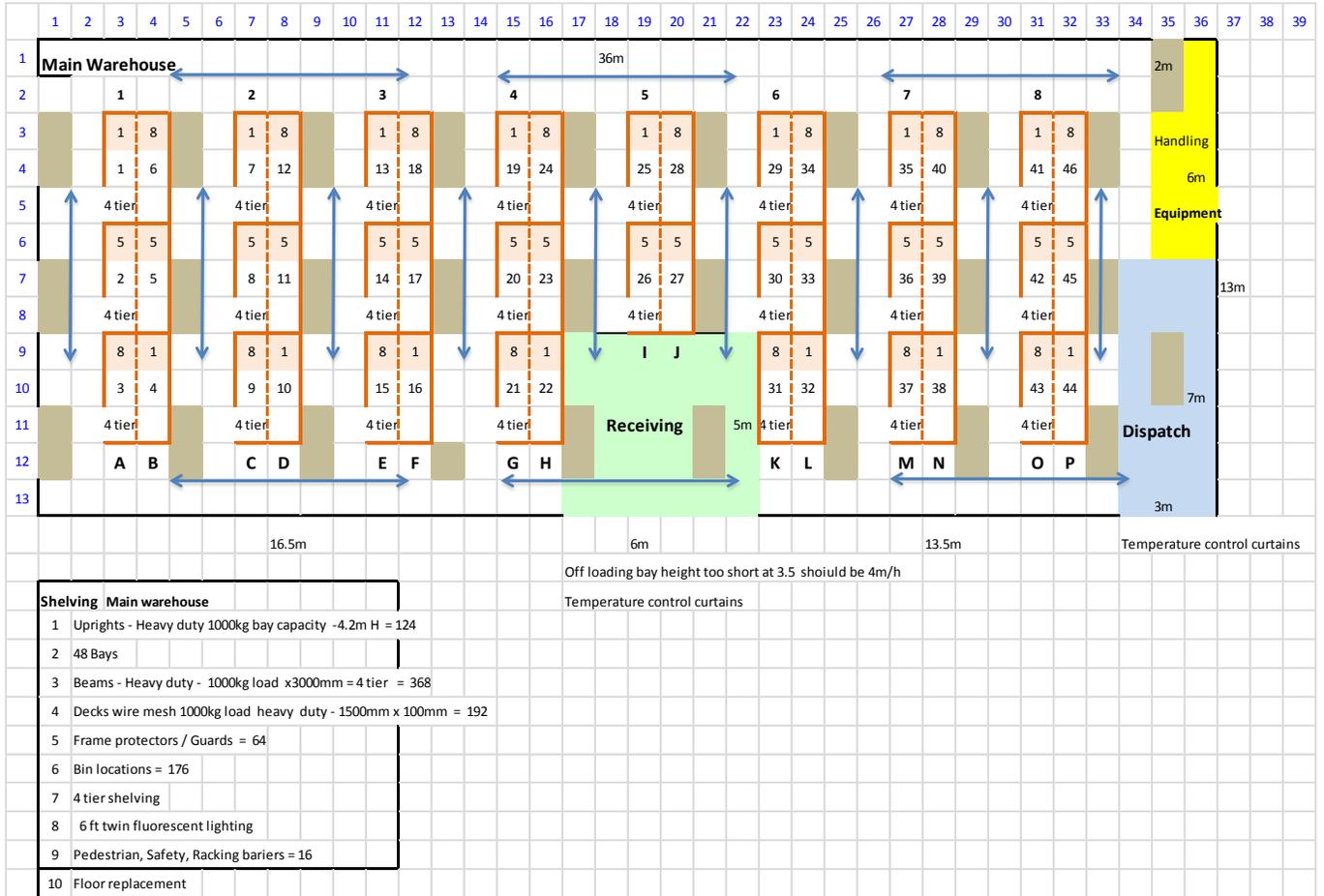


Shelving

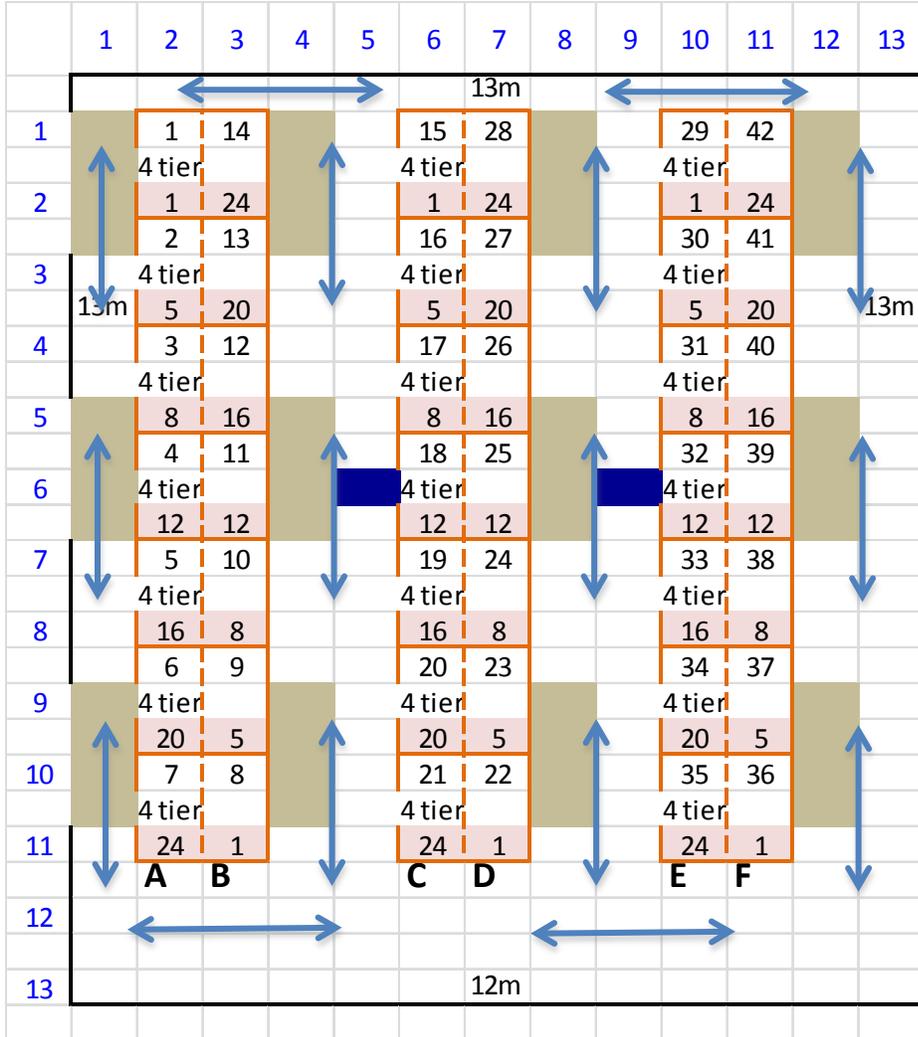
- 1 Uprights - Heavy Duty - 2.8m H = 192
- 2 76 Bays
- 3 Beams - Heavy duty - 1000kg load 1500mm = 4 tier = 640
- 4 Decks wire mesh 1000kg load - 1000mm x 750mm = 640
- 5 Frame protectors / Guards = 64
- 6 Bin locations = 320
- 7 Pedestrian, Safety, Racking barriers = 8
- 8 4 tier shelving
- 9 6 ft twin fluorescent lighting

Shelving										
1	Uprights - Heavy duty 8000kg bay capacity -4.2m H = 400									
2	180 Bays									
3	Beams - Heavy duty - 1000kg load x 3000mm = 4 tier = 1440									
4	Decks wire mesh 1000kg load heavy duty - 1500mm x 1000mm = 1440									
5	Frame protectors / Guards = 80									
6	Bin locations = 720									
7	4 tier shelving									
8	6 ft twin fluorescent lighting									
9	Pedestrian, Safety, Racking barriers = 20									
10	Light plan = 42 6ft twin fluorescent day lights									
11	Floor replacement									

APPENDIX C1: FLOOR PLAN FOR KHULNA REGIONAL WAREHOUSE

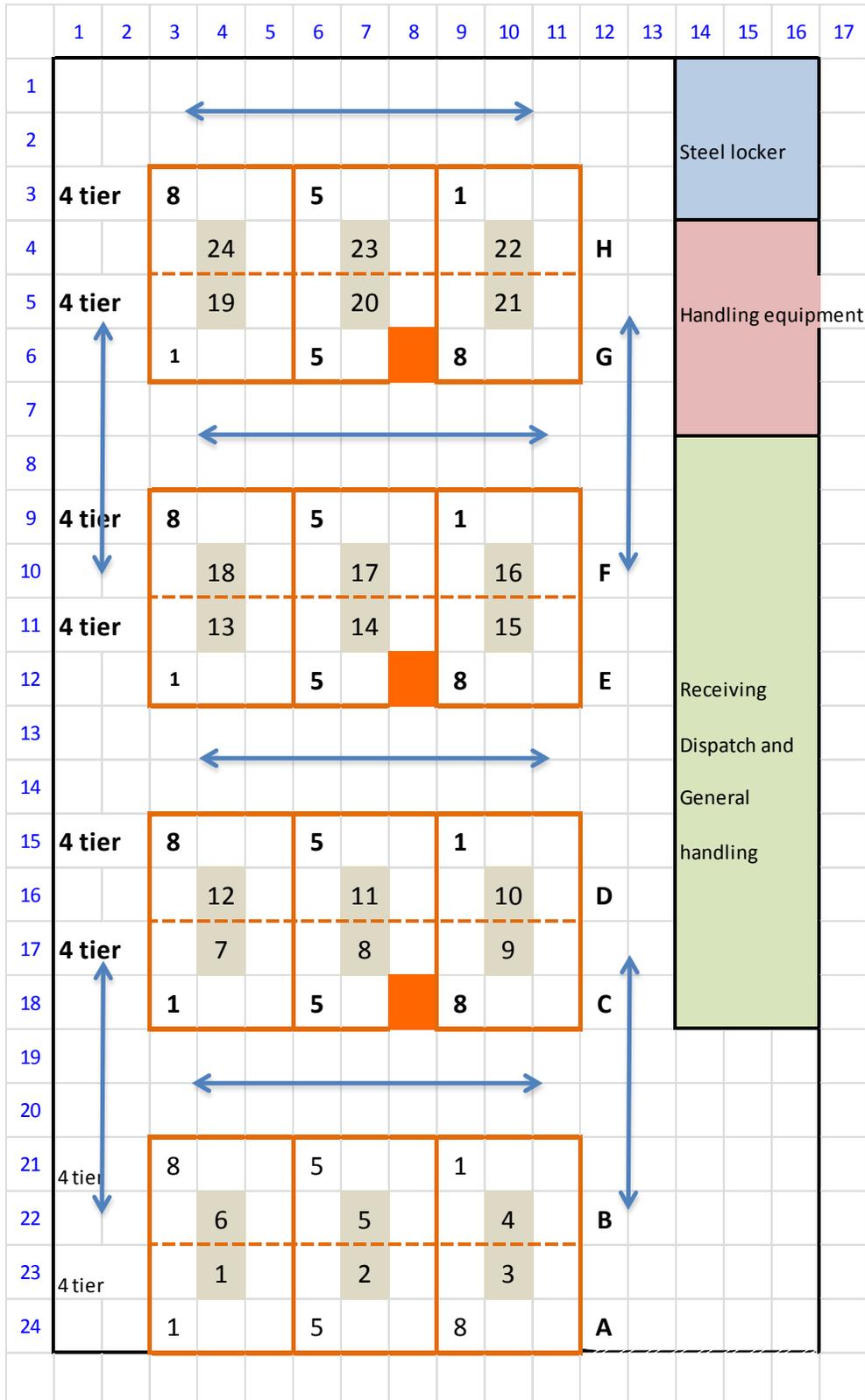


APPENDIX C2: FLOOR PLAN FOR KHULNA REGIONAL WAREHOUSE (LOW TEMPERATURE)



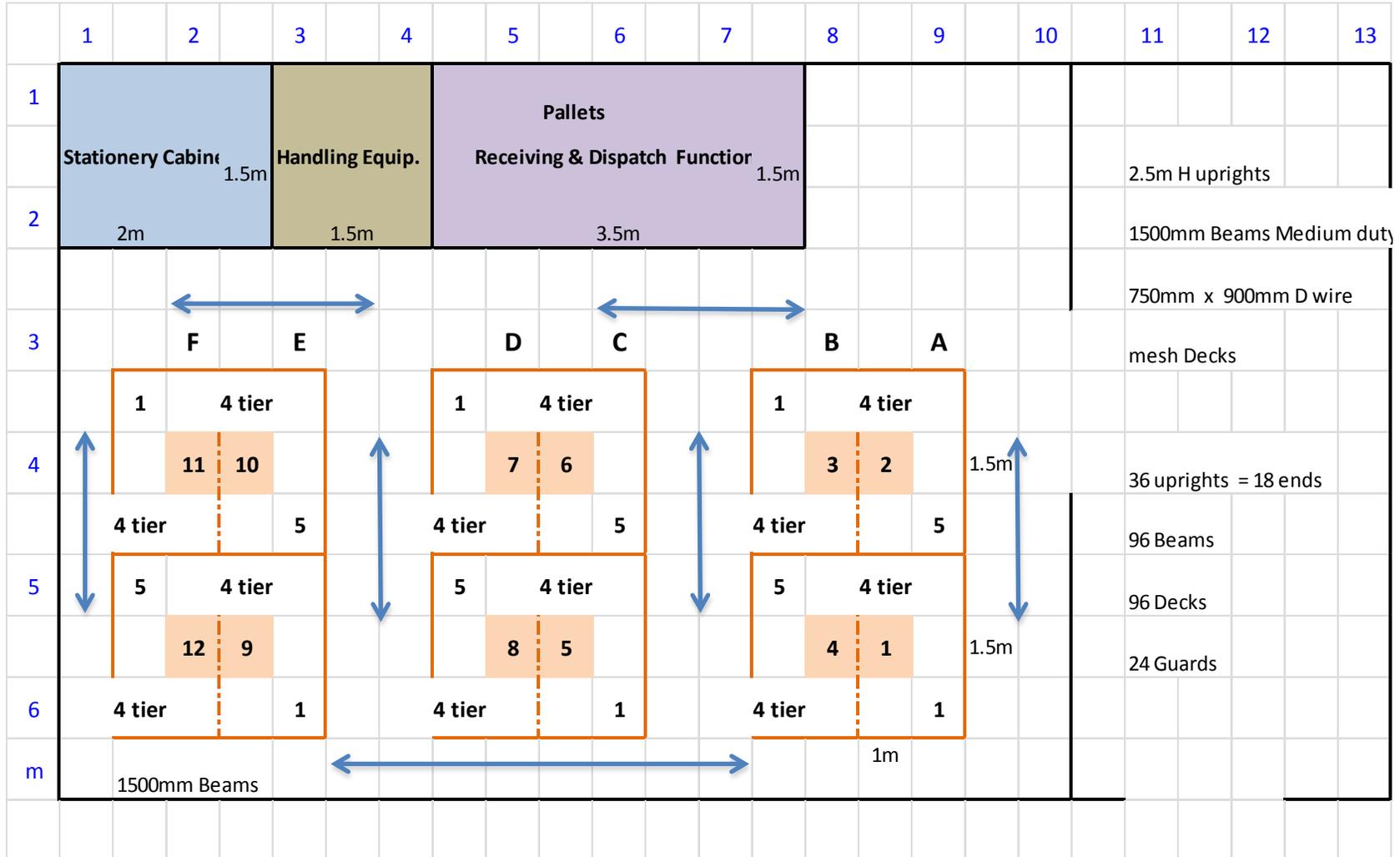
Shelving		Low Temp store
1	Uprights - Medium duty 2000kg bay capacity - 2.0m H = 96	
2	42 Bays	
3	Beams - Medium duty - 400kg load x 1200mm = 4 tier = 336	
4	Decks wire mesh 400kg load medium duty - 600mm x 900mm = 336	
5	Frame protectors / Guards = 24	
6	Bin locations = 168	
7	4 tier shelving	
8	6 ft twin fluorescent lighting	
9	Pedestrian, Safety, Racking barriers =	

APPENDIX E: FLOOR PLAN FOR BOALKHALI WAREHOUSE



Shelving											
1	Uprights - Medium duty 2000kg bay capacity -2.5m H = 64										
2	24 Bays										
3	Beams - Medium duty - 400kg load x 1500mm = 4 tier = 192										
4	Decks wire mesh 400kg load medium duty - 750mm x 900mm = 192										
5	Frame protectors / Guards = 32										
6	Bin locations = 96										
7	4 tier shelving										
8	6 ft twin fluorescent lighting										
9	Pedestrian, Safety, Racking barriers = 4										

APPENDIX F: FLOOR PLAN FOR SHATURIA WAREHOUSE



1	Uprights - Medium 2000kg bay capacity - 2.5m H = 36								
2	12 Bays								
3	Beams - medium duty - 400kg load x 1500mm = 4 tier = 96								
4	Decks wire mesh 400kg load medium - 1000mm x 750mm = 96								
5	Frame protectors / Guards = 24								
6	Bin locations = 48								
7	4 tier shelving								
8	6 ft twin fluorescent lighting								

APPENDIX H: SITES VISITED AND KEY PERSONNEL CONTACTED

Name	Designation	Department
Mr. Amir Hossain	Director General Family Planning	DGFP
Dr. Zubayer Hussain	Country Program Director	SIAPS / MSH
Mr. Md. Abdullah	Senior Technical Advisor - Logistics	MSH / SIAPS
Mr. Md. Saiful Islam	Additional Director	Central Warehouse
Mr. Md. Azim Uddin	Technical Advisor - Logistics	MSH / SIAPS Central Warehouse
Mr. Abu Shah Jamal Molla	Technical Advisor - Logistics	MSH / SIAPS
Mr. Mohammed Hossain	Technical Advisor - Logistics	Khulna Regional Warehouse
Mr. Mian Abdul Kader	Technical Advisor - Logistics	Chittagong Regional Warehouse
Mr. Syed Ahammed Mostafa Al-min	Technical Advisor - Logistics	Sylhet Regional Warehouse
Mr. Abdullah Imam Khan	Senior Technical Advisor - Procurement	MSH / SIAPS
Fatema Samdani Roshn	Senior Technical Advisor - Procurement	MSH / SIAPS
Mr. Mahmudul Islam	Managing Director	Softworks Ltd
Mr. Ashraful Alam Mollah	Program Coordinator	MSH / SIAPS
Dr. Kamal Hossain	Technical Assistant - TB	MSH / SIAPS
Mahommed Akter Hossain	Finance & Admin Manager	MSH / SIAPS
Dr. A. T. M. Sanaul Bashar	Senior Technical Advisor – TB Program	MSH / SIAPS
Golam Kibria	Senior Technical Advisor	MIS
Mr. Md. Lutful Kibria	Supply Officer in Charge	Regional Warehouse Tangail
Prieth Wish Chandra Buse	Pharmacist	RWH Tangail
Mahfuza Ahmed	Upazila Family Planning Assistant	Family Planning Office
Dilara Islam	Regional Supplies Officer	RWH Khulna
Abul Khair Sheikh	Store Keeper	RWH Khulna
Dilara Islam	Upazila Family Planning Officer	Rupsha Health Complex
Mr. Md. Shahidul Islam	Upazila Family Planning Assistant	Rupsha
Mohammed Abul Kalam	Assistant Director – Port Clearance	RWH Family Planning Chittagong
Mahamad Shil Alem	Regional Supplies Officer	Chittagong
K. M. Faruk Hossain	Store Keeper	RWH Family Planning Chittagong
Emran Hossain	Upazila Family Planning Officer	Boalkhali
Dipankar Rudra	Upazila Family Planning Assistant	Boalkhali
Rupam Ghosh	Upazila Family Planning Assistant	Boalkhali