

Chapter 1 Background of the Project

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Chapter 1 Background of the Project

1-1 Background of the Project

The Republic of the Fiji Islands, belonging to Melanesia, located in the center of the South Pacific (south latitude 15 - 22 degrees, east longitude 174 degrees to west longitude 177 degrees) is the Island country, consisting of approximately 330 islands, which is also located as the center of traffic and distribution to the Pacific Island Countries (PICs). The total population as of 1997 is 773 thousand, and the 75% of the whole population live in Vitilevu Island. The population of the Capitol Suva City amounts to approximately 75 thousands.

Compared with the huge sea area of 7000 thousand square kilometers, the land area is no larger than 18,300 square kilometers or almost as large as Shikoku Island of Japan.

The Vitilevu Island, where the capitol is located, and the Vanua Levu Islands occupy 90% of the total land area. The climate is tropical, and the republic islands are mainly classified into volcanic island and coral reef. The former rises and falls steeply, forming the 1000 meter-high mountain from the sea level, while the latter is generally flat.

What supports the Fiji economy are Sugar and Sight Seeing Industry. Foreign Currency Introduction Policy, forwarded from the '80th, brought the development to the apparel and other manufacturing industry, and the industrial base of the country has gradually expanded. Although the GNP is 2460 US dollars per capita (year 2000), the sugar production and the sight seeing industries are easily influenced by the outer factors, such as international price, natural disaster and political unstableness. The growth rate of GDP continues one step forward and back, and the economic basis is not regarded as stable.

The Fijians and the Indians, who divide the population almost evenly, continued the political and economical conflicts. The Parliament-Occupation Incident by the Armed Group broke out in May, 2000 and the then president resigned. The election was taken place this year, but the influence to the economy is inevitable.

Under this circumstance, the Ministry of Health (MOH) is promoting the 'Fiji Health Management Reform : 1999-2004', conforming to the 'Development Strategy for Fiji:1997' and 'National Health Plan:1998-2002'. In this project, the duty of the responsible agency or Fiji Pharmaceutical Services of MOH is clearly designated to improve the pharmaceutical services, such as stabilized supply of the 'Essential Drugs' at the proper price to Fiji. As the concrete policy of the execution agency or Fiji Pharmaceutical Services, the subscription of consumables such as dentals and laboratories currently subscribed separately by individual medical organizations, will be centralized into the Services, in addition to the ordinary pharmaceuticals.

The Pacific Island Countries including Fiji, depend on importing pharmaceuticals and consumables to be used in the countries. However, they have major problems in stable supplying of pharmaceuticals, being obliged to purchase them in rather expensive price system, because of the background as of small population, of being geographically isolated islands, and of the undeveloped transportation system. Since WHO or World Health Organization has been proposing for many years for the Island Countries to purchase pharmaceuticals jointly, it was commonly confirmed that the Joint Purchase Plan was one of the method to solve the problem at the Conference of the Ministers of Health of the Pacific Islands held in Yanuca Islands, Fiji in 1995. Continuously, seven island countries including Fiji made up Joint Bulk Purchase Scheme (hereinafter referred as JBPS) based in Fiji in 1998. There is actual record of purchasing from Fiji by five countries, such as Tuvalu, Nauru, Kiribati, Cook Islands and Vanuatu so far.

In April, 2001, the JBPS Workshop expanding the frame of participant countries was held in Fiji, in the presence of eight countries, Fiji, Tuvalu, Cook Islands, Tokelau, Marshal Islands, Nauru, Kiribati and Vanuatu and the concrete measures for the future was discussed among those countries.

Fiji Pharmaceutical Services (FPS) of MOH, is not only supplying pharmaceuticals, medical goods, linens, X-ray consumables, etc to the domestic public medical organizations by free of charge, but also supplying pharmaceuticals to the domestic private medical organization (including pharmaceutical suppliers and wholesale traders), and to the peripheral PICs at low price by JBPS. The FPS possesses the warehouse for containing pharmaceuticals near Suva Port. The FPS functions not only as the Pharmaceutical Warehouse, but as the administrative office of the Services, which also rents the supplemental warehouse near the existing one at the Walu Bay.

However, the circumstance of the existing warehouse gets worse as the pharmaceutical stockyard, due to the superannuation of the facility such as rain leakage, extreme accumulation of bulky goods, inadequate temperature control and the lack of unloading and temporary piling spaces. Furthermore, it causes the deficiency of managing the Lot / Inventory control due to the inefficient pharmaceutical management, and accelerates the quality deterioration of the supplied pharmaceutical. The dispersion to two facilities also causes the deterioration of work efficiency.

The target of the Project is to provide with the system to supply pharmaceuticals stably to the domestic public medical organization and to the private medical organization (including pharmaceutical suppliers and wholesale traders), as well as to the peripheral Pacific Island Countries, by constructing and moving the new Fiji Pharmaceutical Services Center with the warehouse and administrative function, to the new Site.

The plan for stable supplying 'safe and trustworthy' pharmaceuticals to PICs by JBPS 'at low price' was confirmed to be promoted in the Workshop of April, 2001, continuously after the said Yanuca Declaration by WHO support in 1995, and the Rarotonga Agreement in 1997.

In implementing the Project to benefit both Fiji and the PICs, the Republic of the Fiji Islands has thus requested to Japan the Grant Aid concerning the construction of the new Fiji Pharmaceutical Services Center, procurement of the equipment due to the lack of the needed national budget.

1-2 Contents of the Request

1-2-1 Contents of Original Request

Listed below are the items included in the facilities plan and equipment plan as requested by the Fiji Government.

(1) Facility:

The construction of the new Fiji Pharmaceutical Services Center consisting of pharmaceutical stores, handling and common space (approximately 4,532 sq. meters) with Pallet Rack system, Issuing Racks, Cold Stores as the containing facilities.

(2) Equipment:

Forklifts (2.5tons x 2 vehicles)

Computer system

Quality Test Equipment (active ingredients test, uniformity test, impurities tests, dissolution and disintegration test, and sterility test)

1-2-2 Modification of the Contents of Request made during the Basic Design Survey

(1) Facility:

1) The change of the Site

The construction site was changed to Vatuwaqa Site from Tamabua Site, due to the inadequacy of the area for the future building expansion. The address of the Site is: Lot 1 on Plan SO. 1168, Golf Link Road, Vatuwaqa, Suva. Although the Site is used as the Army's playground for the moment, it was agreed to split the site to keep the 80 meter-wide construction site for the building, at the northern part of the whole area.

2) Modified Matters along with the Modification of Organization

The execution agency was originally 'the Government Pharmacy' at the time of request, it

was confirmed that the name was lately changed to the 'Fiji Pharmaceutical Services(FPS)'. The MOH requested to accommodate all the personnel under the Chief Pharmacist or the top of FPS into the FPS Center, along with the organization change.

3) The additional space for dental and laboratory consumables

The MOH requested the additional space for procurement in order to integrate to FPS as one policy of Fiji Health Management Reforms.

4) The additional space for emergency store

The MOH requested the additional space for emergency pharmaceutical storing, in case of the outbreak of infections diseases in Fiji and PICs.

(2) Equipment

The modified contents of equipment through discussions and their are as follows:

1) The elimination of equipment for quality testing

Both parties confirmed that the quality testing does not comply with the function of the targeted facility for containing the pharmaceuticals. Fiji side would prepare such function within Fiji in cooperation with other organization in the future.

2) The addition of transportation equipment

This is dependent on the policy to prepare in-house transporting system, in order to improve the safety and quality of pharmaceutical transporting work, currently entrusted to the private transporting company, due to the superannuation of the existing trucks.

3) The addition of educational visual equipment

This is the additional request of equipment necessary for the implementation of education and training of pharmacists of the Center and of all the country, which is regarded as one of the major service of this organization.

4) Storing equipment

Although this is not specified in the list of original request, the minimum storing equipment were additionally requested, in order to commence the services smoothly when the new building is completed.

(3) Soft Component

The introduction of rational 'Inventory Control System', utilizing the computer was requested in the Project. Along with the introduction, the technical cooperation concerning the operation was requested during the Basic Design Study, it was agreed as appropriate to

be dealt with by the 'Soft component', consultant services under the Grant Aid, as the result of discussion by both parties.

The stable supplying system of the 'safe and trustworthy' pharmaceuticals at low price will be established, by implementing this project and by expanding JBPS both in quality and quantity. As the result, it is expected that the medical activities will be improved in quality and expanded in quantity and that the health situation will also be improved in Fiji and PICs.

Chapter 2 Contents of the Project

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Chapter 2 Contents of the Project

2-1 Objectives of the Project

Fiji Pharmaceutical Services Center (FPSC) is one component of Fiji Pharmaceutical Services (FPS), a department of the Ministry of Health to procure, store, and supply the essential drugs to the country's public health facilities. In addition to provide pharmaceuticals to the public health facilities without charge, the FPSC currently sells them at low price to the private sector in Fiji and the Pacific Island Countries (PICs). The FPSC takes a leadership role in promoting the Joint Bulk Purchasing Scheme (hereinafter referred to as "JBPS").

The objectives of construction of the New FPSC are to transfer and to revitalize a hub distribution center, where low price, safe and trustworthy pharmaceuticals can be stably supplied to Fiji and PIC through the JBPS between Fiji and PIC.

The FPSC consists of its headquarters, a warehouse section, and a supplementary rented warehouse located adjacent to Walu Bay of the Suva Ports. The center handles a broad range of hospital goods and equipment other than pharmaceuticals.

The storage lot run by the FPS has substantial problems, including water leakage, overloading, inadequate temperature control, lack of storing space, an inappropriate working environment, and insufficient product lot management and stock control. All of these factors could contribute to the service's inadequate quality management for the goods it stores. Moreover, geographical separation of the service's two storage facilities weakens the efficiency of its work.

In view of the above problems, the Government of Fiji has requested construction of a new FPSC to ensure a stable supply to the country's public health facilities through the BPS and to private sector healthcare suppliers such as retail pharmacies and wholesalers and to PICs through the JBPS, the promotion of sales to BPS customers, the handling of dental and laboratory items, and the storage of items to handle outbreaks of disease.

2-1-1 Functions and Activities of the New Fiji Pharmaceutical Services Center

Storage conditions are expected to be considerably improved through the construction of a new facility and training for the staff.

While the FPSC is only one segment of the FPS, it is very significant, for the stable provision of pharmaceuticals by the FPS, to have line branches such as the Business and Essential Drugs Branch (BED) and the Inspectorate and Regulatory Affairs Branch in the same building. For this reason, the physical integration of the branches into the new FPSC will make their operations more efficient and contribute to the quality and stable distribution of pharmaceuticals to Fiji and its neighboring PICs.

As the procurement function for both national procurement schemes and the Joint Bulk Purchasing Scheme is centered at the FPSC, the department of BPS purchases items from the FPSC when necessary. In terms of storage and distribution, the BPS has its own warehouse inside of the FPSC, and it supplies items customers as shown in Table 2-1.

Table 2-1 Roles of FPSC

Roles	Description
1) Purchasing	• Low-price and high quality items
2) Warehousing	• Appropriate storage • Adequate stock
3) Distributing	• Provision of free items to public health facilities in the country: Divisional Hospital, Special Hospital, Sub-divisional Hospital, Health Center, Nursing Station and etc. • NBPS(National Bulk Purchasing Scheme): Sales to private health facilities in the country General practitioners, retail pharmacies, wholesalers and etc. • JBPS(Joint Bulk Purchasing Scheme): Sales to the PICs Pacific Island Countries (Tuvalu, Kiribati, Nauru and etc)

2-1-2 Roles in Fiji

The national roles of the FPSC are to provide hospital items to all public health facilities in the country free of charge, and to sell hospital items to private health units and pharmacies. The items are distributed to public facilities in the country either by FPSC vehicle or a private courier service. Deliveries are made monthly, every two months, or every four months, based on the levels of usage at the receiving hospitals.

2-1-3 Roles in the Region

Fiji's Ministry of Health, in collaboration with World Health Organization and PICs, aims at stable distribution of pharmaceuticals at cheaper prices for the Pacific region. The Joint Bulk Purchasing Scheme (JBPS) is its core effort to achieve this goal. According to the scheme concept, quality pharmaceuticals can be distributed more cheaply to the PICs by centering the bulk purchasing function within the FPS, the center of distribution. This notion follows two regional agreements seeking improved healthcare among the PICs, namely, the Yanuca Island Declaration in 1995, and the Rarotonga Agreement in 1997. Table 2-2 shows five countries (Tuvalu, Nauru, Kiribati, Cook Islands and Vanuatu) that have procured pharmaceuticals through the JBPS.

Table 2-2 JBPS Sales by country (FJ\$)

	1998	1999	2000
Tuvalu	66,151	45,437	66,609
Nauru	27,248	38,744	8,958
Kiribati	494	0	0
Cook Islands	0	0	5,880
Vanuatu	0	0	7,599
Total (a)	93,892	84,181	89,045
(a) of the total FPS budget (%)	0.8%	0.7%	0.7%

Note: The PIC customer can select the mode of transport (air/sea).

Table 2-3 Summary of the Questionnaire on JBPS by the PICs

Country	Past participation in JBPS	Future plan for participation	Reasons not to participate in the past	Expectation from future JBPS
Niue	-	○	Not yet discussed	• Provision of low cost and good quality drugs
Tuvalu	○	○		• Increase range of drugs • Increase number of drugs analyzed by TGA and provide information on pharmaceuticals • Start internet services
Cook Islands	○	○	Contract made with other supplier	• Price • Quality control
Tokelau	-	○	Not yet agreed at national level	• Reduce handling time
Marshall Is	-	○	Not yet discussed in the country	• GMP application and Improvement of Quality Control • Quality assurance by FPS
Kiribati	○	○		
Nauru	○	○		
Vanuatu	○	○		• 10 items to be ordered first • start participating from 2002

Source: Based on the results of a questionnaire survey on Collaboration in Drug Purchase, conducted at the Small Island States Workshop held in April 2001

Note: Blanks mean “questionnaire not collected.” Niue did not participate in the workshop but answered by fax.

As shown in Table 2-3, PICs noted a variety of reasons for not having participated in the JBPS. One of the concerns of the PICs about the FPSC is the insufficient quality control caused due to the aged and poor condition of its storehouse. On the other hand, each country expects the FPSC to stably supply pharmaceuticals at a fair price. Vanuatu is planning to procure from 2002. Thus, it is also widely expected by other PICs that the FPSC's stock control and storage condition would be improved by this Project.

2-2 Basic Concept of the Project

2-2-1 Basis of the Plan

Following is a description of the basic plans for the new FPSC, formulated in consideration of the above objectives and roles.

- (1) From the standpoint of efficiency in transport, a careful examination is conducted to select the site for the Project between the two candidates -Suva, by request of the Government of Fiji, or Nadi, with its access to an international airport.
- (2) The conditions for calculating adequate storage capacity to avoid over-estimation are set clearly, considering population growth and increment in demand as more countries participate in the JBPS.
- (3) All the information for warehouse management is centralized through computerization.
- (4) Storage sections are put within a well-insulated, dust-proof environment.
- (5) Cost of operation and maintenance, e.g., for ventilation and air-conditioning equipment, is minimized.
- (6) The facility is designed for the Fijian physique.

- (7) The facility is adapted to the features of Fiji's climate, such as heavy rain, high temperatures and humidity, and cyclones.

2-2-2 Building Site

(1) Selection of the Site

Although the construction site specified in the Terms of Reference is within the Suva City, the Basic Design Study Team also investigated and studied Nadi, where the international airport is located, as another candidate site. For the reasons given below, Suva City was ultimately selected as the construction site:

- Suva City is convenient as Government Offices and Customs are located inside.
- Suva City possesses main public hospitals.
- Suva City is highly effective as the domestic distribution center, as there is only a relatively short distance between harbor to the center.
- Suva City is highly effective as the distribution center to Vanua Levu and other islands.

Table 2-4 Comparative Study of the Site

		Suva City	Nadi City	Remarks
Public Administration			×	As the administrative agencies including MOH are centralized in Suva City, Suva is more dominant.
Dominance for selecting the site			○	Nadi City is dominant in the flexibility of selecting the site.
Distribution to Domestic Users		○		As the population is scattered mainly in eastern part of the country, where Suva is located, Suva is a little dominant.
Convenience of Dispatching	Domestic Distribution (Inside Fiji Islands)			
	By Land	○		As the traffic in the Viti Levu Island is mainly dependent on the road which are well maintained in Suva City, Suva is dominant.
	By Sea		×	As for the delivery of drugs to remote islands, the delivery depends on boats, and the boats depart from Suva Harbor, Suva is absolutely dominant.
	International Distribution (To PIC)			
	By Sea	○	×	Although there is the harbor for loading imported goods, Suva Harbor is still the center of distribution.
	By Air		○	Both cities possesses the international airport, Nadi is dominant regarding the number of flights and arriving/departing of airplanes.
Convenience of Receiving				As all medical goods are imported now, and basically unloaded at Suva Harbor. However, small amount of emergency drugs like vaccines are unloaded at Nadi City by air.

(2) Selection of the Construction Site

Since the area of Tamabua site proposed in the Grant Aid Application Form is insufficient for the future expansion of the facility, the construction site was changed to the Vatuwaqa site.

The construction site is located in the Vatuwaqa district near the eastern shore of Laucala Bay. The Mineral Resources Department within the Ministry of Lands and Mineral Resources declared that the coral reef along the seashore would minimize the potential impacts of tsunami (tidal waves). The construction site is a swamp area that was reclaimed some 15 years ago. Data from the Mineral Resources Department show that a solid layer suitable as a supporting bedrock foundation for the building is located 10 m under the surface (10 – 20 meters in the eastern part of the site near the front road). A soil survey reconfirmed the presence of the supporting rock at an average depth of 10 meters. The soil above the rock consists of soft alluvium and a 2-meter deep layer of FILL, and the groundwater level was confirmed to be quite shallow, or only about 1 meter deep, at ground level. As the alluvium layer is rather soft and weak, the building foundation is expected to be the pile (stake) type.

The site is almost uniformly flat and is being used as a rugby field by the army. The narrow creek runs between the site and front road, which are connected by a temporary hume concrete pipe. A hard, solid structure will be needed to bear the heavy weight of the traffic in the near future. In addition, it was agreed to split the site for the new building at an 80 meter distance from the north boundary (creek side) near the rugby field.

2-2-3 Basic Concepts of Each Section

The FPSC aims at stable distribution of quality pharmaceutical items at low price, not only for Fiji, but also for the PICs. The organizations and facilities of the new FPSC consist of the following sections.

(1) Storage Sections

In order to assure quality of a large quantity of pharmaceuticals and efficiently warehouse them, the warehouse is divided into two storage sections: the Bulk Store section, where forklifts, pallets and a pallet racking system are introduced, and the Issuing Store section, where small items from unpacked cartons are kept.

(2) Receipt Section

Since pharmaceuticals are received and dispatched by land transport, packing areas are to face the truck yard.

(3) Management Sections

In addition to the FPSC's management sections, the Business and Essential Drugs Branch (BED) and Inspectorate and Regulatory Affairs Branch (IRA) are located on the first floor. The former reports adverse reactions and publishes stock information on essential drugs, and

the latter takes charge of approvals of imported items and drug policies.

(4) Others

The Conference Room, Locker Room, Bathroom, Machinery Room, Electricity Room, and other necessary rooms are set appropriately.

2-2-4 Plan for Distribution and Storage

(1) Distribution and Storage

In planning the contents and calculating the volume of the new FPSC, items that the FPSC handles are identified, storage sections are determined, the split shipment scheme is introduced, temporary storage racks for irregular shipments are set up, and a 20% safety stock is stipulated. The following are taken into consideration when planning distribution and storage.

1) Storage Classification

Storage is classified into sections by temperature settings and the types (essential drugs, dangerous drugs, etc.) and sizes of items (bulk, issued items), and the items in each section are controlled under a fixed-location system.

2) FIFO (First In First Out) and Centralization of Information

Items are labeled with lot numbers (based on the date of receipt) and centralized by the computerized stock management system.

3) Split Shipment

To retain the price merit of bulk purchasing, the split shipment scheme currently applied for I.V. fluids will be expanded to other items such as dressings, linens, and medical consumables. By enabling the FPSC to maintain proper level of stock, this measure is also expected to improve quality control.

(2) Distribution for the Country's Public Health Facilities and for the BPS

Whereas the FPSC sells pharmaceuticals through BPS Department to the private sector and PICs, the FPSC supplies free pharmaceuticals to the public health facilities in the country. Since their account systems are different, the storage rooms for the BPS will be separated from those for the country's Public Health Facilities, as presently seen. The storage classification system will also be used in the BPS storage rooms.

(3) Minimizing Maintenance Cost

Though it would be preferable to store all pharmaceuticals except linens at air-conditioned temperatures, the burden of maintenance cost will make it necessary to keep air-conditioned items to a minimum. Also, a split shipment scheme will be employed to trim down the air-conditioned space.

(4) Estimating Demand

The new FPSC can adjust to the increasing future demand for pharmaceuticals and medical goods due to Fiji's population growth and the increment of JBPS countries by the split shipment scheme without much increment in procurement cost. Therefore, the increasing demand is not taken into consideration in calculating the volume of the new FPSC. And extensions will be built to the rear of the new FPSC when the demand exceeds its capacity.

For reference, Table 2-5, Table 2-6 and Figure 2-1 below simulate the increasing demand in the region between 2005 and 2015, taking the population growth in the region as the major variable.

Assumptions for the demand estimation are:

- Increment in demand for pharmaceuticals has a linear association with increment of population;
- Disease pattern does not change;
- The maximum number of countries to participate in the JBPS is eight
- Treatment guidelines are the same among the PICs.

Table 2-5 Estimated Population Growth of the PICs

	Population	Year of Survey	Estimated Population in 2015	Multiplier: (b)/(a)	Past participation in JBPS
Fiji	831000 (a)	1997	994,000		
Cook Islands	19,100	1997	13,773		○
Marshall Is	62,569	1998	95,648		
Kiribati	77,800	1995	106,259		○
Nauru	11,000	1998	16,462		○
Niue	2,300	1996	1,649		
Tokelau	1,500	1996	1,288		
Tuvalu	9,704	1997	16,520		○
Vanuatu	162,160	1994	283,742		○
Total population	1,177,133		1,529,342(b)	1.84	

Source: United Nations, World Population Prospects; The 1998 Revision Volume , 1999 and WHO, Country Health Information Profiles 1999 Revision, 1999.

The JPPS sales in 2000 accounted for only 0.7% of the total FPS budget, which is a negligible amount. Demand in 2015 is estimated using the multiplier calculated from the population of Fiji in 1997 and the total population in 2015 (see Table 2-5), taking Fiji's population in 1997 as the indicator of regional demand for pharmaceuticals at present. The results show that 2,164 pallets and 338 pallets are required for the non air-conditioned Bulk Store and air-conditioned Bulk Store, respectively (see Table 2-6 and Figure 2-1). However, by introducing the adjusted split shipment scheme, the numbers of pallets required in 2015 can be controlled to less than that of the proposed values; i.e., 1,174 for non-air conditioned and 166 for air-conditioned.

Table 2-6 Comparison of the Estimated Demand and the Adjusted Volume in 2015

Demands in Non Air-Conditioned Bulk Store

Category	Number of Shipments per Year				Category	Number of Shipments per Year (Adjusted)			
	1/yr	2/yr	6/yr			1/yr	2/yr	4/yr	6/yr
A	153	-	96	⇒	A	-	-	-	121
D	121	177	-		D	-	-	30	59
I	26	-	173		I	-	-	-	177
I	103	153	-		I	-	52	76	-
M	311	561	-		M	-	-	358	-
RM	74	-	-		RM	-	37	-	-
X	39	-	-		X	-	19	-	-
Sub-total	826	891	269		Sub-total	-	108	465	357
Temporary Storage Shelf			179		Temporary Storage Shelf				238
Grand total			2 164		Grand total				1 168

Split Shipment Scheme

Demands in Air-Conditioned Bulk Store

Category	Number of Shipments per Year				Category	Number of Shipments per Year (Adjusted)			
	1/yr	2/yr	6/yr			1/yr	2/yr	4/yr	6/yr
A	289	-	29	⇒	A	-	-	72	29
Temporary Storage Shelf			20		Temporary Storage Shelf				20
Total			338		Grand total				121

Split Shipment Scheme

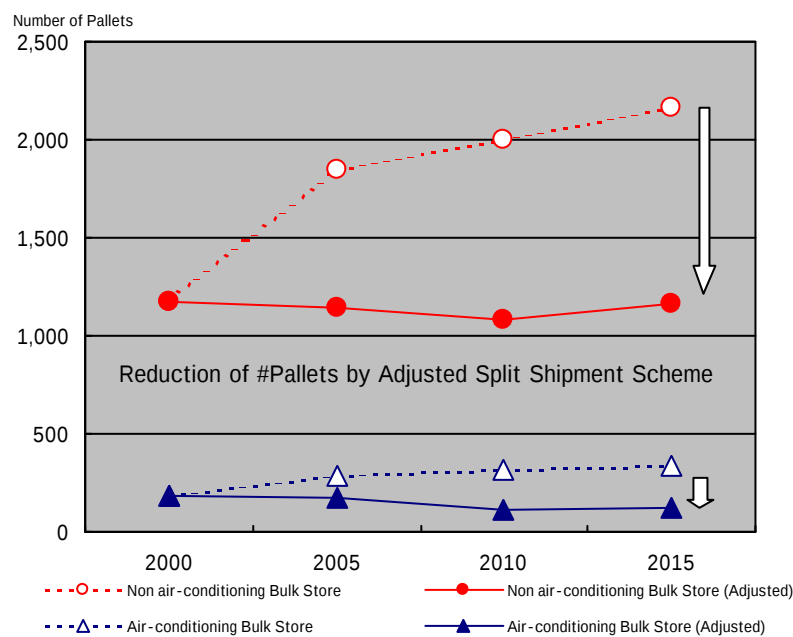


Figure 2-1 Effect of Split Shipment on the Pallets Required

(5) Calculating the Number of Pallets Required: Calculation Flow

The number of pallets required was calculated based on the plan for distribution and storage (see Figure 2-2). The same calculation flow is used for other sections such as Refrigerating and Inflammable Sections, which are not shown in the Figure.

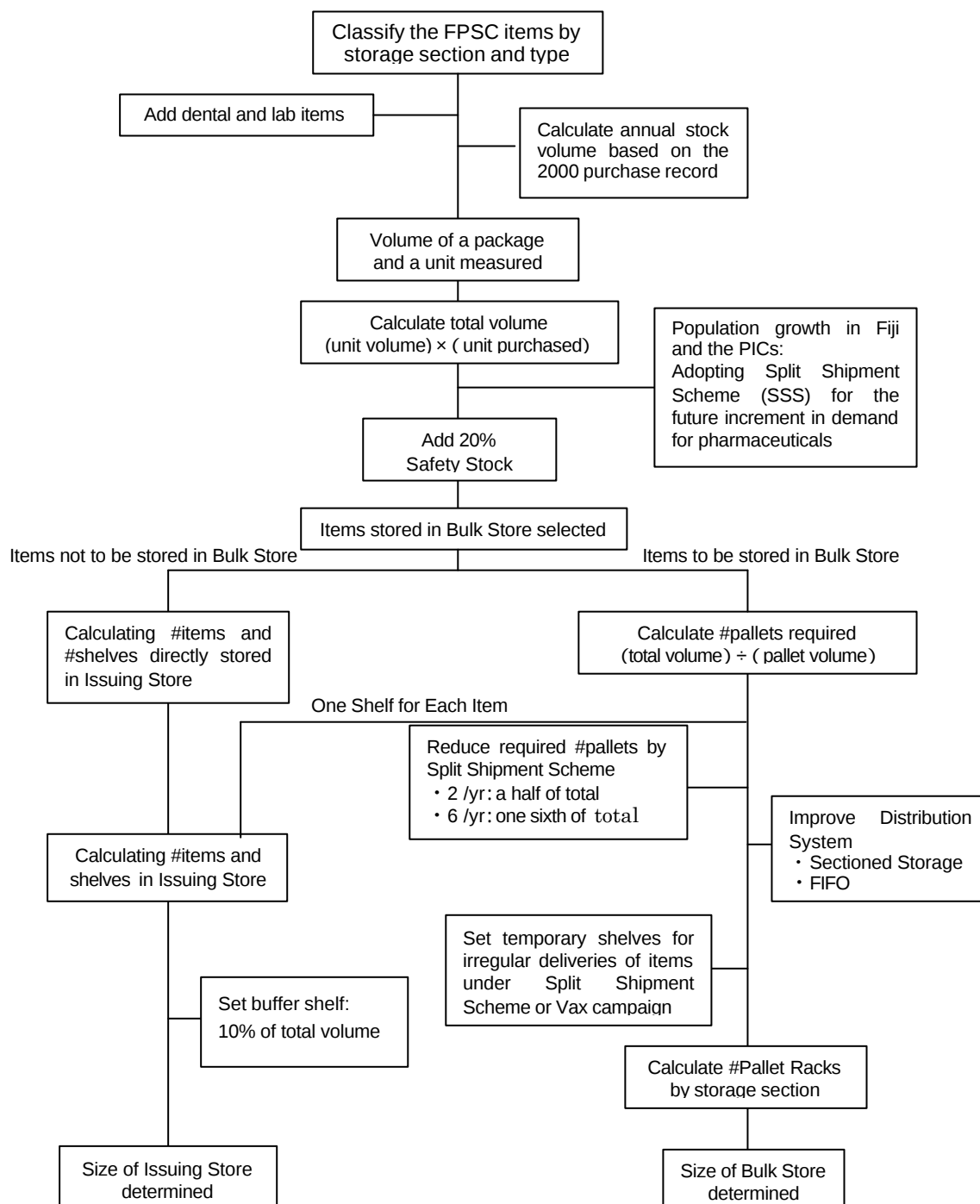


Figure 2-2 Calculation Flow

(6) Plan for Distribution and Storage

1) Basic Concept

Inadequate quality of stored items, insufficient management of the stock, and inefficiency of transferring the stock in the current FPSC are attributed to the physical factors such as the excessive age and narrowness of the facilities. The basic concept to solve these problems for the new FPSC is outlined as follows.

Classification of the Items

a. Items under Storage Classification

To improve quality assurance of the stock, all the FPSC items are categorized and stocked accordingly. Some combinations of the classification shown in Table 2-7 are used for proper stock management.

Table 2-7 Classification of the Items

	Description
Temperature/ Regulatory	Room temperature: below 30 Air-conditioning: below 25 Refrigerating: from 0 to 8 Freezing: minus 20 Inflammable Dangerous Drug
Category	Drugs and vaccines Poison and inflammables Narcotics
Type	Internal (tablet, capsule, powder, elixir, etc.) External (application, suppository, eye drop) Injectables (vial, ampule, etc.)
Size	1000 tabs, 10 vials, 1000ml, 500g
Others	Dental, laboratory items, x-ray items

b. Process of Storage Classification

Following the classification in Table 2-7, the items are identified (see Figure 2-3).

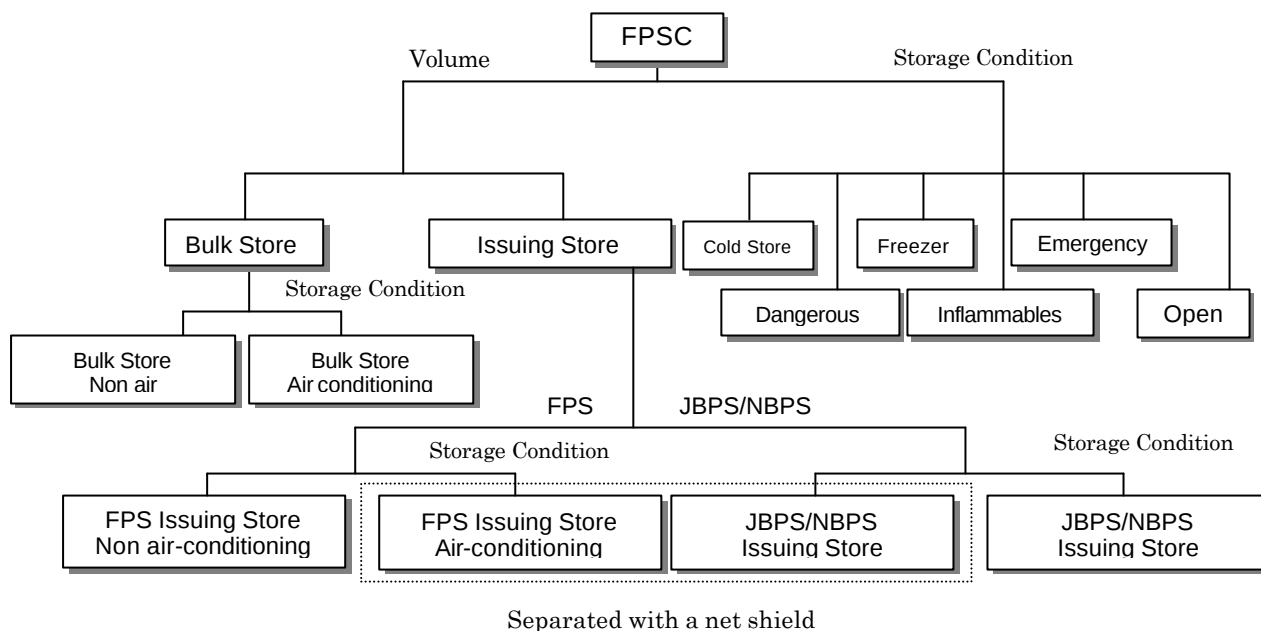


Figure 2-3 Process of Storage Classification

Stock Management Using Pallets and Racks

Pallet Racks and Issuing Racks are installed to prevent the items from scattering and getting lost. The table below outlines the rack management system.

Table 2-8 Outline of Rack Management

	Description
Rack;	Are managed according to type, size and strength of the item
Bulk Rack;	Are used for storing pallets on which unpacked carton boxes are piled
Issuing Rack;	Are used for storing bottles and tines once they are picked up from a carton
Address of Rack;	Each rack has its own address and zoned for the category
Fixed Location;	Stored by fixed location: items are allocated to specific shelves

Fixed-location system

A fixed-location system is adopted, as such a system permits personnel to easily manage stock administration and locate where specific goods are stocked.

First In First Out: FIFO

a. Lot Numbering by Date of Receipt

It is a general rule that pharmaceuticals are stored and issued according to their manufacturing date. However, the new FPSC adopts lot numbering by the date of receipt since the minimum shelf life of imported items stipulated by the Tender Board is 18 months and manufacturing dates are not always written on the packages.

b. Establishing Piling Patterns on a Pallet

A piling pattern on a pallet is established for each item, all piling patterns are registered with the Product Master and revised whenever necessary.

c. Management of Issuing

In issuing an item, FIFO is carried out following the lot-numbering system. Cartons are issued from the Bulk Rack and bottles/tins are issued from the Issuing Rack.

d. Systematic Management by Computerization

Computers are installed to manage the above distribution and storage system, and to centralize the management of receiving, warehousing, and issuing.

2) Selection of Storage Equipment

Pallets

The facilities use a pallet of durable plastic measuring 1,100mm by 1,100mm, the internationally standardized size. The maximum height of one pile on a pallet is set as 1,000mm.

Pallet Racks and Pallet Shelf

The dimension of single Pallet Shelf (or one unit of the rack) will be 2,500mm × 1,100mm × 1,500mm (L × W × H), which can contain two pallets each, and one Pallet Rack consists of four stories. Electric forklifts are used for transferring bulky items.

Issuing Racks and Issuing Shelf

One Issuing Rack measures 1,000mm × 450mm × 400mm (the same as the existing ones), and the height of an Issuing Shelf is 1,700mm (four tiers), an optimal height for preventing errors in picking items. High quantity items in the L category are stored on the bigger rack (1,200 × 500 × 500mm).

3) Calculating Capacity of Each Storage Section

Current Stock

Table 2-9 shows the volume of stock from 1998 to 2000, converted to the required number of pallets (1,100 × 1,100 × 1,000mm). At this point, all items but those in the I category are sent to FPSC once a year. Safety Stock is not considered in ordering.

Since there was a big gap between the stock records and the physical counts performed, we had initially planned to use the purchase records as proxy for an accurate calculation of past stock. However, the purchase records in 1998 and 1999 were found to be inappropriate for analysis due to considerable errors or blanks in the data. Therefore, the purchase record in 2000 is used for the stock calculation.

Table 2-9 Number of Pallets Handled at FPSC from 1998 to 2000

Category	1998 (ref)		1999 (ref)		2000	
	# of Shipments		# of Shipments		# of Shipments	
	1/ yr	6/ yr	1/ yr	6/ yr	1/ yr	6/ yr
A	808	-	803	-	568	-
D	104	-	31	-	216	-
I	15	60	9	-	12	76
L	78	-	3	-	183	-
M	417	-	541	-	674	-
RM	35	-	8	-	33	-
V	0.4	-	0.3	-		-
X	7	-	0.6	-	27	-
Sub-total	1,464	60	1,396	-	1,713	76
Grand-total	1,524		1,396		1,789	

Source: FPSC Documents

Note: Of all items, the percentages of errors/blanks in recording (including zero-purchase) are 55% in 1998, 68% in 1999, and 14% in 2000.

Stock at the New FPSC

a. Calculating the Stock in the Bulk Store

Pallets and pallet racks are introduced in the Bulk Store of the new FPSC.

The following describes conditions for calculating the stock.

i. Conditions for Calculation

- Safety Stock

To avoid stock-outs, 20% Safety Stock is set for all the items.

- Items to be stored in the Bulk Store

Any item procured in an annual volume exceeding the capacity of four Issuing racks is stored in the Bulk Store.

- Number of Shipments

As mentioned, all items except those in the I category items are delivered once a year. In order to improve quality assurance, vitalize the stock, and use pallet racks efficiently, the split shipment scheme, with deliveries scheduled twice or six times per year, is introduced. The details of the scheme are as follows.

* A category items, pharmaceuticals have to avoid stock-outs. Through the split shipment scheme, the FPSC can manage risk of overdue deliveries and thus prevent stock-outs. Items occupying more than ten pallets annually and collectively accounting for 75% of the total volume in the FPC are defined as top-ranking items and adopted for the Scheme.

In deciding the number of shipments to be made, the purchasing cost is deemed to increase by 4.4%, an unacceptably high level, when a 12-time-per-year scheme is adopted. Accordingly, a six-time-per-year scheme with a lower burden on the purchasing cost (2.2%) is adopted.

- * As for the A category items under air-conditioning, the items that occupy more than seven pallets annually and account for a 74% share of total volume are defined as top-ranking items and adopted for the Scheme in order to save air conditioning space and reduce the cost. Among these items, those that require over ten pallets are put under the six-time-per-year scheme, while those that require between 7 and 10 pallets are under the twice-a-year scheme, thereby arriving at a 10-pallet volume per one shipment.
- * I category items are put under the same six-time-per-year scheme used in the past.
- * A twice-a-year scheme is applied for the D, L, and M items, which require over 10 pallets per year. The volume of one consignment of these items is arranged to be approximately 10 pallets.
- * Since the RM and X categories do not include bulky items, a once-per-year scheme is adopted.
- Temporary Storage Shelves for Irregular Shipments

Temporary Storage Shelves are to accommodate cases when the FPSC receives two consecutive deliveries, or when there is a sudden expansion of the stock due to a vaccination campaign.

 - * The shelves are primarily for temporary warehousing the items under the six-time-per-year scheme, which are delivered irregularly.
 - * In receiving these items, the fixed-location system is cancelled and shelves left vacant due to the consumption of the stock are utilized for space-saving purposes. The Temporary Storage Shelves are controlled under a fluid location system and the items on the shelves are re-located as soon as a fixed shelf becomes vacant.
- Establishing Non Air-conditioned and Air-conditioned Store Sections

All pharmaceuticals should be mainly stored under a controlled temperature and humidity. However considering the increment of maintenance cost, the air-conditioned space will be limited.

Through series of discussions with the FPSC, it is agreed that items known to be less stable under tropical conditions will be selected for storage in air-conditioned facilities, referring to the scientific foundations from WHO and UNICEF studies.

On April 5, 2001, the date of closing the field study, there were five items listed as air-conditioned items. However, in the “Workshop of Small Island States for Collaboration in Drug Purchases,” held in Nadi on April 10-11, 2001, some of the participant countries asked the FPS to re-examine the items. Heedful of these requests, the FPS started revising its selection criteria for air-conditioned items. After arranging the relevant data, the FPS issued a report entitled “Drug Stability: The effects of Temperature and Humidity on Pharmaceuticals during Transportation and Storage” in June 2001.

Considering the project’s impact on the region and effects on promoting the PICs’ participation in the JBPS, careful investigations on this issue were carried out.

Ultimately, the items stipulated in the report were recognized as Fiji's list of items to be stored under air-conditioned temperatures. Thus, 85 items were added to the previous list of 5 air-conditioned items, bringing the total up to 90. Of these 90 items, 56 are stored directly in the Issuing Store since they collectively share less than 4 Issuing Racks.

ii. Calculating Non Air-conditioned Items

Following the above conditions, it is calculated that 1,079 pallets are required for warehousing the FPS, JBPS and NBPS items.

Table 2-10 Items to be Stored in the Non Air-Conditioned Bulk Store^{Note1}

Category	Number of Shipments					
	1/yr		2/yr		6/yr	
	#pallets per shipment (w/o SS20%)	#items	#pallets per shipment (w/o SS20%)	#items	#pallets per shipment (w/o SS20%)	#items
A	83 (62)	63	-	-	52 (42)	9
D	66 (54)	16	96 (77)	9	-	-
I	14 (12)	4	-	-	94 (76)	7
L	56 (46)	23	83 (67)	6	-	-
M	169 (136)	60	305 (244)	24	-	-
RM	40 (33)	10	-	-	-	-
X	21 (17)	4	-	-	-	-
Sub-total	449 (a) (360)	180	484 (b) (388)	39	146 (c) (118)	16
(a)+(b)+(c)	1,079 (866) 235 Items					
Temporary Storage Shelf ^{Note 2} (d)	95					
Grand-total (a)+(b)+(c)+(d)	1,174					

Note 1: Figures in parentheses show the actual number of pallets required to accommodate the real volume. Due to the rounding up of decimals, sub-totals do not necessarily correspond to the 20% figure given for the actual number of pallets required. e.g.) "A" category: $62 \times 120\% \neq 83$

Note 2: Refer the following section for the rationale used to calculate the Temporary Storage Shelves.

iii. Calculating Air-conditioned Items

Of the 90 air-conditioned items in the A category, 34 items are stored in the air-conditioned Bulk Store and the rest are directly stored in the air-conditioned Issuing Store. As mentioned in the previous section, the items that share 74% of total volume, requiring more than seven pallets annually, are defined as top-ranking items and adopted for the Scheme in order to save air conditioning space and reduce the cost.

Table 2-11 Items to be Stored in the Air-Conditioned Bulk Store^{Note1}

A Category	Number of Shipments					
	1/yr		2/yr		6/yr	
	#pallets per shipment	#items	#pallets per shipment	#items	#pallets per shipment	#items
Number of pallets (w/o SS 20%)	123 (a) (103)	27	17 (b) (14)	4	16 (c) (13)	3
Sub-total (a)+(b)+(c)	156 (130) 34 Items					
Temporary Storage Shelves ^{Note2} (d)	10					
Grand total (a)+(b)+(c)	166					

Note 1: Figures in parentheses show the actual number of pallets required to accommodate the real volume.

Note 2: Refer the following section for the rationale used to calculate the Temporary Storage Shelves.

iv. Temporary Storage Shelves

Temporary Storage Shelves are built in for cases when the FPSC receives two consecutive deliveries of an item under the six-time-per-year scheme. There is no Temporary Storage Shelf for vaccination campaign items that can be placed in the Open Section, such as syringes and disinfectants.

* Non Air-conditioned items

Number of pallets for Temporary Storage Shelves: 95 pallets = 118* - 23**

* Necessary number of pallets to absorb two consecutive deliveries of a six-shipment-per-year item

** Given the 80% average occupation rate of shelves for six-time-per-year items (refer the attached for details), there are 23 vacant pallets ($118 \times 20\%$).

* Air-conditioned items

Number of pallets for Temporary Storage Shelves: 10 pallets = 13* - 3**

* Necessary number of pallets to absorb two consecutive deliveries of a six-shipment-per-year item

** Given the 80% average occupation rate of shelves for six-shipment-per-year items, there are three vacant pallets ($13 \times 20\%$).

b. Calculating the Stock in the Issuing Store

i. Conditions for Calculation

• Non Air-conditioned Items

As a rule, all items but those stored in Cold Store, Freezer, Inflammable and Dangerous Drug Sections are stored on their own shelves under a fixed-location system. However, the items that require less than four Issuing Racks annually and are not stored in the Bulk Store are allotted a maximum of four Racks to easily accommodate the stock.

• Dental and Laboratory Items

The dental and laboratory items are added to the item list to meet the request of the FPS. They are relatively small, and items of different sizes and strengths can be stored in the same Issuing Racks with partitions. In total, 200 Racks are provided for 711 dental items and 100 Racks are provided for 359 laboratory items.

• Calculating the Number of Racks Required

The number of the Issuing Racks (1,000 × 450 × 400mm) for each item is calculated based on the usage volume for the item.

ii. Calculating Non Air-conditioned Items

The number of the Issuing Racks is obtained following the above calculation conditions.

Table 2-12 Items to be Stored in Non Air-conditioned Issuing Store

Category	Items in the Bulk Store	Items in the Issuing Store				Buffer Racks ^{*2}
	#Items (=# of Racks)	>1 Rack/item		1 Rack/some items		
		#items	#racks	#items	#racks	
A	67	262	314	0	0	4
D	25	14	26	0	0	4
I	10	0	0	0	0	4
L ^{*1}	29	8	11	0	0	4
M	84	204	283	0	0	4
RM	10	13	17	0	0	4
X	4	42	58	0	0	4
Uncategorized	0	23	23	0	0	4
Dental	0	0	0	711	200	4
Laboratory	0	0	0	359	100	4
Sub-total	229	566	732	1,070	100	40
Grand total	1,301					

* 1: Shelves for L category items are a different size than the others.

* 2: Since items less than four Racks are directly stored in the Issuing Store, each category is allotted four racks as a buffer to absorb irregular deliveries.

Following revision of the Essential Drug List every two years, the FPSC reviews and deletes items that are not consumed or are otherwise unneeded. This effort enables the FPSC to store the minimum necessary amount of pharmaceuticals to ensure a stable supply to the countries. On this basis, it is concluded that the maximum number of Issuing Racks should not exceed 1,301.

iii. Calculating Air-conditioned Items

Ninety items are to be stored in the air-conditioned Issuing Store, including 56 items requiring less than four Issuing Racks and 34 items stored in the air-conditioned Bulk Store.

Table 2-13 Items to be Stored in Air-conditioned Issuing Store

	Items in the Bulk Store	Items in the Issuing Store				Buffer Racks
	#Items (=# racks)	>1 Rack for an item		1 Rack for some items		
		#items	#racks	#items	#racks	
A Category	34	56	81	0	0	8
#Issuing Racks		123 (90 Items)				

Note 1: 8 racks, 10% of the approximate real volume, are added as buffer.

c. Calculating the BPS Issuing Store Items

i. Conditions for Calculation

Supplies for the country's public health facilities are free of charge whereas those through the BPS department are charged. Therefore, for account management purposes, the items of the BPS are stored separately from those for Fiji's public health facilities. As of 2001, BPS handles 75 items. Of them, 54 items are non air-conditioned, 21 items require air-conditioned and the rest do not. The number of the Issuing Racks is calculated to adjust to future increment of BPS items that might be employed from the FPS list.

ii. Calculating Non Air-conditioned Items

There are 54 non air-conditioned items. Thirty racks are fixed for temporary storage of small items for the National Bulk Purchasing, and 80 racks are provided in total. The 30 racks are calculated from the average handling volume for each NBP customer and include 15 for general practitioners, 10 for retail pharmacies, and 5 for wholesalers.

Table 2-14 Items to be Stored in JBPS Issuing Store

# JBPS Items (#racks)	80
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iii. Calculating Air-conditioned Items

There are 21 items to be stored under the air-conditioned system. Considering the future demand increment for these items, 90 racks are set for antibiotics, which yield a larger profit in price for the PICs.

Table 2-15 Items to be Stored in the JBPS Air-conditioned Issuing Store

# JBPS Items (#racks)	90
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d. Other Items

The other items are to be stored in the Storage Sections, as follows.

i. Cold Store Items(between 0 and 8)

Refrigerating items in the FPSC are classified into A, X and V categories. For convenience in handling the items, both A and X items are stored in the same section, and V category items are stored in another section. Racks are set based on annual volume of each item and under control of the fixed-location system.

• Cold Store Section-1

Table 2-16 A and X Category Items

Category	# Items	# Racks ^{Note1}
A	38	76 (40)
X	7	55 (42)
Sub-total	45	131 (82)
Buffer Racks		8
Grand total		139 ^{Note2}

Note 1: Figures in parentheses show the actual number of pallets required to accommodate the real volume.

Note 2: 8 racks, 10% of the approximate real volume, are added as buffer.

• Cold Store Section-2

As shown Table 2-17, some of the small V items are stored in one rack and bigger items are allotted racks according to their volumes.

Table 2-17 V Category Items

Cat.	No.	Item	Issuing Racks ^{Note1}
V	0002	BCG*	1 (1)
V	0003	Cholera*	
V	0004	DPT*	
V	0005	HBV infant	3 (2)
V	0006	HBV adult	1 (1)
V	0007	HBV Immunoglobulin adult	
V	0011	Rubella Vaccine*	
V	0012	Tetanus Toxoid	1 (1)
V	0013	Tetanus Immunoglobulin	
V	0014	PPD Human Tuberculin (Mantoux)	
V	0015	PPD Human Tuberculin (Heaf)	1 (1)
V	0016	Typhoid Vaccine*	
V	0019	Haemophilus Influenzae B Vaccine*	
		Intragram*	1 (1)
		Menningococcal*	
		HIB-ACT*	
Sub-total			8 (7)
Buffer Racks			1
Grand total			9 (7) ^{Note2}

Note: Annual volumes for the items with asterisks, which have no purchase records, are calculated referring to the volume of Tetanus Immunoglobulin.

Note1: Figures in parentheses show the actual number of pallets required to accommodate the real volume.

Note2: 1 rack, 10% of the approximate real volume, is added as buffer.

ii. Freezer (minus 20)

Of V category items, some items specifically requiring a freezing environment are stored in a freezer rather than a freezing room. These are stocked in Nadi and delivered to the FPSC every two months. The freezer volume is estimated in consideration of the cost reduction in transport between Nadi and Suva, and based on the assumptions that the FPSC manages these items in the future and that the items are delivered three times per year at most.

Table 2-18 Items in the Freezer

Category	Item	Volume: m ³
V0008	Measles*	0.18 (0.15) **
V0010	Oral Polio	0.78 (0.65)
V0017	Yellow Fever Vaccine	0.03 (0.03)
	Measles 10doses	0.24 (0.20)
Sub-total		1.23 (1.03)
Buffer		0.10
Grand total***		1.33 ^{Note}

*: Measles (V0008) are replaced by Measles 10 doses presently.

**: Figures in parentheses show the actual number of pallets required to accommodate the real volume.

***: Total volume under a three-time-per-year scheme is estimated as 0.45(=1.33 ÷ 3) m³.

Note: 0.10 m³, 10% of the approximate real volume, is added as buffer.

iii. Inflammable Section

Items to be stored in the Inflammable Section are allotted Issuing Racks according to their volumes

Table 2-19 Items in the Inflammable Section

Category	Item	Issuing Racks ^{Note1}
A 0140	Ethyl Chloride	1 (1)
A 0172	Halothane	3 (2)
A 0229	Methylated Spirit 500ml	15 (12)
RM 0005	Ether solvent BP	7 (6)
RM 0006	Formalin BP	6 (5)
RM 0028	Sodium hypochlorite 1%	22 (18)
RM 0030	Alcohol	32 (26)
RM 0031	Methylated spirit	-
Sub-total		86 (70)
Buffer		7
Grand-total		93 ^{Note2}

Note1: Figures in parentheses show the actual number of pallets required to accommodate the real volume.

Note2: 7 racks, 10% of the approximate real volume, is added as buffer.

iv. Dangerous Drug Section

Table 2-20 shows items stored in the Dangerous Drug Section where narcotics and other controlled substances are secured with a lock. A fixed-location system is adopted. Each item allotted one rack and bulky ones are provided more as required. Two racks, 10% of the approximate real volume, are added as buffer.

Table 2-20 Items in the Dangerous Drug Section

Category	Item	Issuing Racks ^{Note1}
A0090	Codeine Phosphate	1 (1)
A0142	Fentanyl	7 (5)
A0225	Methadone	1 (1)
A0238	Morphine Sulphate 10mg/1ml	3 (2)
A0239	Morphine Sulphate 1mg/1ml	4 (3)
A0274	Pethidine 50mg/1ml	2 (2)
A0275	Pethidine 100mg/2ml	2 (2)
A0444	Morphine sulphate 10mg Tab.	1 (1)
A0445	Morphine sulphate 20mg Tab.	1 (1)
Sub-total		22 (18)
Buffer		2
Grand total		24 ^{Note2}

Note 1: Figures in parentheses show the actual number of pallets required to accommodate the real volume.

Note 2: 2 racks, 10% of the approximate real volume, are added as buffer.

e. Summary of Storage Sections

Table 2-21 summarizes the Equipment, Temperature Setting, Item categories, and Number of Items in each section.

Table 2-21 Summary of equipment, facility and items in each storage section.

Storage Section	Equipment	Temp.	Items	#items
Non air-conditioned Bulk Store	Pallet racks	<30	A, D, I, L, M, RX, X categories	235
air-conditioned Bulk Store	Pallet racks	<25	Some of A category items	34
Non Air-conditioned Issuing Store	Issuing racks	<30	A, D, I, L, M, RX, X, Dental and Laboratory items	1,865
Air-conditioned Issuing	Issuing racks	<25	Some of A category items	90
Cold Store 1	Issuing racks	0-8	Some of A and X categories	45
Cold Store 2	Issuing racks	0-8	Vaccines	16
Dangerous Drug Store	Issuing racks	<30	Some of A category items	9
Freezer Space	Freezers, Refrigerators	<-20	Vaccines	4
Inflammable Store	Issuing racks	<30	A and RM categories	8
Emergency Store	Issuing racks	<30	Drugs and Medical Consumables for Outbreak	50
Miscellaneous Store	-	<30	Vaccination Campaign Kits	10

(7) A Plan of Stock Management System

1) Logistics Management System

In order to improve data consolidation, the basic concept of the new logistic management system is to link the flow of items with that of information (Figure 2-4).

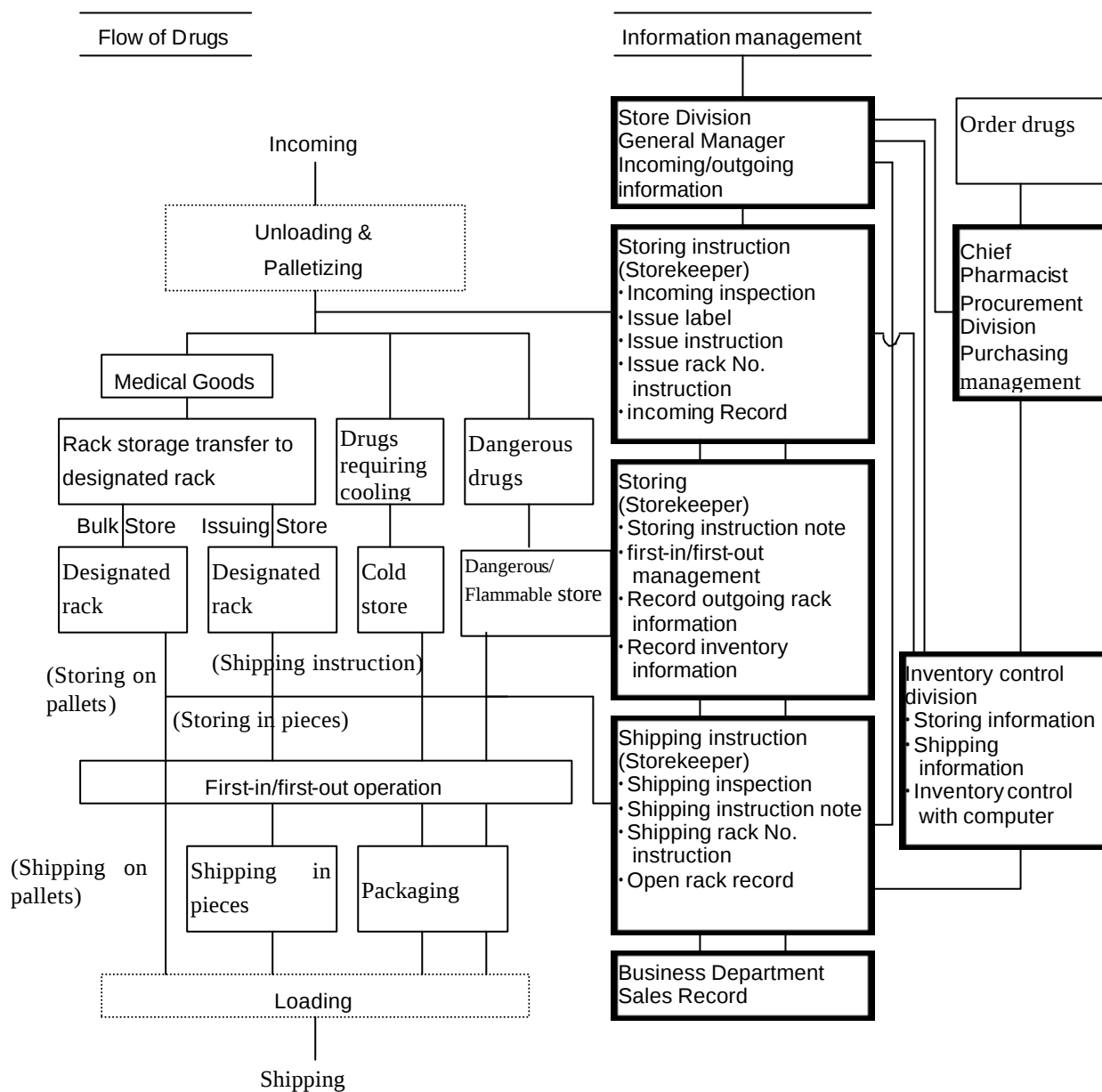


Figure 2-4 Drug Flow and Information Management

Following the aforesaid concept, the new management system is compared with the present one at each stage in the flow of items and information (Table 2-22).

Table 2-22 Flow of Items and Information in the New Management System versus the Current System

Stage	Current System	New System	Advantages in the New System
Before Receiving	A specific activity is not made.	Health facilities are registered in the computer.	• Accessible to consumption data of each facility
Receiving	Received items are checked with dealer's notes of delivery and these notes are sent to the Department of Procurement.	Items are registered Receipt Card is issued Storage Label is issued	• Size of a carton is measured and registration is made by smallest unit of an item (e.g. tab, cap, vial etc.) • Piling pattern on a pallet is registered. • Information of Receipt Card and Stock Management Card is unified. • Bar coding System can be introduced in the future.
Warehousing	Date of receipt, name of item and number of units are recorded in the Stock Card for both Bulk Store and Issuing Store. The Cards are used as sock Control Card Items are manually unloaded and	Storage Label is attached and if discrepancy with physical count is found, the data is reported to the Receipt Office. Transferred to Bulk Store by Forklift. Managing staff confirm the location of each item.	• Discrepancy of received items is found by labeling each carton. • Damages by manual activities can be avoided.
Storing	Items are piled in the Bulk Store when received. Transfer records from Bulk to Issuing Store is kept in the Stock Card of the Issuing Store. Stock Record keeping has started with physical counting since 2001 and is merely posting figures on the Stock Card requiring five days.	A fixed-location system is introduced and fluid location system is used inside a zone Transfer Card is issued and the stock in Bulk Store is checked in every transfer. Receiving and dispatching records are consolidated and issued every month-end. Stock data is consolidated by item and by unit.	• Location of each item can be identified by zoning and rack address • Space is minimized by combination of fixed and fluid location system. • Transfer from Bulk to Issuing becomes clear. • Prevent discrepancy • Regularly accessible to stock records. • Regular stock is established in the future and is used as data in ordering.
Picking and Packing	Based on the Ordering Sheet (three-folded), items are taken out from Issuing Store. White Paper: Issuing Red Paper: Checking Blue Paper: Invoice Managing staff are responsible for each category's leakages. Every issuing is recorded in Sock Card.	Current Ordering Sheet and managers' responsibility for a category is retained and utilized. Data on Ordering Sheet is input to Issuing Card. The Issuing Card is also a record for off-the-shelf items and checked to avoid an input error. Every issuing is recorded in Stock Card and counterchecked by physical counting.	• Easy access to purchase records by facility • Issuing Card can be used as Stock-taking data.
Dispatching	Inspection and checking are made in dispatching.	Stock Card is used as Shelf Card which is allocated to each item.	

As shown in Figure 2-4 and Table 2-22, the new logistics management system revises and records stock information at each stage of physical distribution. Also, in every shelving and issuing activity, the data on the record sheet and actual number of stocked items are counterchecked.

In addition to quarterly stock taking, physical counting is introduced and encouraged while the staff is trained in appropriate drug handling, in order to reduce the amounts of leakage reported in the past.

2) Personnel Allocation in the New Logistic Management System

By streamlining the business of the new FPSC through introduction of computers and other new equipment, staffing for the departments is re-examined. The new personnel allocation is outlined as follows.

Warehouse Manager

The current managing position for the warehouse is the Warehouse Manager. However, the Warehouse Manager has a limited responsibility and often faces difficulties in managing an entire store. Therefore, to efficiently control personnel and stock in the warehouse, a Warehouse Manager will be stationed to take charge of both administration and working sections.

Separation of Administration (Recording) Section from Working Sections

Currently, administration and working activities are being carried out in the same section. In the new FPSC, separate sections and staffs will be assigned to separate functions. This is expected to reduce errors in data recording.

Establishing Stock Control Department

The present FPSC has no full time department to control stock and stock data. The staff of BED and IRA Department collect and consolidate data when needed, and this often delays their primary activities. The new FPSC has a Stock Control Department predominantly involved in controlling the stock information and supervising stock-takings. This department also arranges stock data and helps to disseminate these data to health facilities in Fiji and neighboring countries in collaboration with the BED and IRA. During an actual stock-taking operation, working staff in the Receipt and Dispatch Department are sent out to the department and work under it.

Reducing Staff in the Dispatch Department

Since a function of stock management in the Dispatch Department is transferred to the Stock Control Department, the Dispatch Department might be able to reduce its staff and to specifically work for dispatching. Also, for efficient staffing, picking and packing staff in the Dispatch Department hold additional, concurrent postings in the Receipt Department.

Strengthening the Purchasing Department

The Purchasing Department presently has one Officer and one Assistant Officer. Since this department handle huge volumes of data on the JBPS and purchases of health units, it

clearly needs more assistants.

Training of the operation worker for the newly introduced equipment

About ten personnel will be needed for the operation of computers, and two personnel for the operation of forklifts. These personnel will be adopted among the most appropriate of the existing staff, and they will be brought up through the training by the suppliers.

3) Suggestions for the Maintenance System

Maintenance in the New FPSC

The new maintenance system introduces pallet racking and other systems representing drastic changes for the FPSC. Therefore, it is essential for the present staff to be trained on maintenance and management of the new facility.

- Maintenance and management of the new FPSC
- Management of computer software of stock control
- Back-up of data and measures for damages for computers
- Management of pallet rack system
- Appropriate handling of pharmaceuticals

Maintenance of Newly Introduced Equipment

Newly introduced equipments such as computers, forklifts, vehicles, etc., adopt a maintenance system currently used for the FPS vehicles. This equipment maintenance method is subject to no penal regulation and assigns the responsibilities for cleanliness and minor maintenance of vehicles to the drivers. This system has been found to work quite well in terms of raising awareness of proper use among the staff.

In practice, the system is implemented through inputs of a Soft Component Program on maintenance and management of the new FPSC and discussions with an existing voluntary support group. The system also relies on peer pressure from the support group and introduces ID plates bearing pictures of the operators and the equipment for which they are responsible. The Public Works Department manages major troubles with the equipment, as in the past.

2-2-5 Basic Concept of Equipment

(1) Contents of requested equipment

During survey study the requested equipment were confirmed as final 23 items as listed below.

- | | |
|---------------------------|----------|
| 1) Computer system | one lot |
| 2) Fax machine | 2 units |
| 3) File cabinet | one lot |
| 4) Copy machine | 2 units |
| 5) Wheel trolley | one lot |
| 6) Hand driven power lift | one lot |
| 7) Medical refrigerator | one unit |

8) Cooling box	one lot
9) Truck	4 units
10) Folk lift	3 units
11) Picking cart	one lot
12) Roller conveyer (movable type)	one lot
13) Work table	one lot
14) Pallet	one lot
15) Freezer	one unit
16) OHP	one unit
17) Slide Projector	one unit
18) Video presenter/Video projector set	one set
19) TV/VTR set	one set
20) Security Camera	one set
21) Paging system	one lot
22) Pack for pallet	one lot
23) Shelves for issuing store	one lot

Equipments listed in single units/sets above will actually be provided in plural units/sets.

(2) The result of study on the requested equipment

Following are the results of the detailed studies for each type of equipment

1) Computer system w/LAN

At present, the transaction processes in this center are performed manually using vouchers when the transactions take place. Here, “manual” means that all of the required information is written by hand on the voucher. Unfortunately, due to human error, the staff often makes mistakes when transcribing the necessary information and goods are delivered to the wrong places as a result. It is also difficult to control the inventories in real time, which results in either shortages or overstocking of the required medicines at the center. To resolve this problem, the introduction of a computer system will be urgently required and entirely justifiable when all of the functions are transferred to the new center. Therefore, the computer system is planned as requested. The concept of this system will be; 1) Install personal computer at necessary room. 2) The file server will be installed in the computer room. 3) All PCs and a file server will be connected by Lan system 4) Therefore same information will be accessible from all PCs. The software used on this system will be commonly used one in the market, which is based on the data base. Format to be used for transaction will be newly created as suited for this particular purpose through Soft Component.

2) Fax machine

The use of facsimiles is very common and frequent in receiving orders and communicating with clients. There is one five-year-old machine in this center and its condition is not well. The plan is to replace the old one when the new facility is completed. Two machines were initially requested, but only one is planned, in view of the volume of transactions.

3) Filing cabinets

Due to volume of vouchers and record paper, the number of requested filing cabinets is justifiable. Two types of cabinet are planned—a general type and a file cabinet. One general cabinet will be provided for each office worker, and one file cabinet will be provided for every 3 office workers. These cabinets will be placed in every necessary rooms.

4) Copy machine

There is one copy machine located at the office of the chief director. Due to the nature of the business, copying the documents is an important process and the request seems to be justifiable. Sometimes even the fax machine is used for this purpose when the copy machine is very busy. The initial request was 2 machines, but only 1 is planned in view of the volume of documents copied.

5) Wheel trolley

There are now 2 working wheel trolleys at this center. As this is insufficient to convey the volume of goods handled, goods are often moved by hand. At times, goods fall off the trolleys accidentally and are damaged. Wheel trolleys are a basic tool to move goods, and 4 are planned—2 regular trolleys and 2 for bulk transportation (since 2 are still operable, 2 will be newly planned). In addition to the regular trolleys, there was request for a cage wheel trolleys for temporary stock. It is preferable to stock goods for same customer in order to avoid mis-delivering instead of storing several goods for several customers. This request was deemed to be justifiable, and it was resolved to plan for an appropriate number of trolleys of this type for handling goods at the peak time of day. According to the data collected in the Basic Design Survey, 400 items are delivered from 11 facilities each day. The capacity per cage wheel trolley is 0.62cu.m, and the average packed volume is about 0.027 cu.m. Therefore, simple calculation gives 18 such cage wheel trolleys. As it is recommendable to stock the goods based on the client base, 20 such cage wheel trolleys is an appropriate number (18 + ~10%).

6) Hand-driven power lifts

This equipment is not used at this moment but will be required when the new pallet system is introduced. This equipment is considered auxiliary equipment for use with the forklift. Two units will be installed at the office where goods are delivered.

7) Medical refrigerator

This refrigerator will be used for temporary storage when a medicine is delivered or just after the container is unpacked. As this equipment is essential for quality control and there is none at present, one is planned as requested.

8) Cooling box

A cooling box is used for goods that must be kept cool, such as vaccines. At present such medicine like vaccine is delivered by carton box with full of ice pack. A vehicle with a cooling mechanism was initially requested for this purpose, but due to the maintenance cost it was proposed to use cooling box that can be mounted on a regular truck. The cooling box has a very important function for quality control. The product to be placed in this box will be categorically type-A medical products such as Insulin, stored in volumes of 7.2 cu.m per year, including cooled vaccine (1.62cu.m per year) and frozen vaccine (1.33 cu.m per year). Volume for one batch will be about 128 liters in consideration of the volumes of the medicines paced and transported. (total volume is 1.62 cu.m.per 12 months which become 0.85 cu.m. per month. Average delivery per month is 10 which becomes 0.085 cu.m.when convert to freight ton it become 0.128 cu.m. Since 1 cu.m. is 1000 litter therefore it became 128 cu.m.) in consideration of the flexibility of the transport, two types of boxes are planned. Four is the large size, for shipments of approximately 20 liters, and 5 is the small size, for shipments of about 10 liters are planned.

9) Truck

One 7.5-ton truck was purchased in 1995 and is still operating. However, this truck has had two accidents so far and is in poor condition with a need for frequent repairs. Replacement is considered necessary. Three trucks were initially requested, as it will be safer for the facilities to operate the trucks themselves than to hire outside courier services to convey the medical products. At the very least, one truck to replace the old one and one 2-ton truck to be used for transportation to remote islands will be necessary. Based on the present transportation volume, 2 vehicles would be more appropriate than four.

10) Forklift

Since the pallet system has not been introduced for storage, there has been no forklift. At the new facility, there are plans to introduce a pallet system with 4 stacks. Therefore, this equipment is absolutely necessary. The initial request was for 3 forklifts, it is not justifiable due to the handling volume. At present 70 pallets will be max. at peak time. Folk lift can handle 25 pallets per day so one folk lift considered adequate. But with consideration of emergency situation such as regular maintenance and mechanical trouble, additional one is required. It will be judged two is adequate number. Alternative plan was considered. But from the point of safety one additional lift is required though one will be OK based on the frequency of use it. Due to this reason there will not be any alternative plan exists. Two folk lift is justifiable.

11) Picking cart

At present the center has 3 carts similar to the supermarket type. As these carts are not suited for the purposes for which they are used, they are inefficient at this center. For this project, 10 picking carts are planned as 10 operations will be conducted at one time.

12) Roller conveyer (movable type)

This equipment is used for moving goods between trucks and warehouses. It is deemed necessary, as it makes operations swift and smooth. Two are planned. One will be installed at the delivery area and a second one will be installed at the dispatch area.

13) Work table

The current request for work tables and chairs is considered adequate. The work tables will be used for sorting out the goods. Several of worktables will be placed in the dispatcher's office, and one table and chair will be installed in each office.

14) Pallet

The inventory control will be made based on the pallet system. The required number of pallets, estimated from the volume of products, is 1340. With a contingency of 3%, the total required number of pallets will be 1380.

15) Freezer

At present 3 freezers are being installed. All 3 will be moved to the new facility when it is completed. They are in quite good condition, and there is no anticipation of a sudden increase of medicine to be frozen. For these reasons, the priority for new freezers is judged to be low, and thus they will not be installed.

16) OHP

An OHP will not be planned, as the slide projector listed below can be easily used as a substitute.

17) Slide projector

18) Video presenter / projector set

19) TV/ VTR Slide projector

The audiovisual equipment listed in 17) to 19) will be used at meetings and training sessions. This new facility will also function as a retraining center for pharmacists. Due to new inventory system, this equipment will be used for education and training in the new facility. Therefore one of each is planned.

20) Security Cameras

Security Cameras are not installed in the existing building, and will not be installed in the new building, considering the low priority.

21) Paging System

Paging system will be involved in the electric facilities construction.

22) Rack for Pallet

Rack for pallet will be involved in the building construction, considering the fabrication and the installation of these equipment inside the building.

23) Shelves for issuing store

Shelves for issuing store will also be involved in the building construction, considering the fabrication and the installation of these equipment inside the building.

2-2-6 Basic Concept of Soft Component

The request was made to have inventory control system by introducing computer system along with new facility is constructed. It is very common in the country having such inventory control system by computer in the similar facility as well as in Japan. Therefore the request to have this kind of system is justifiable. However they have only small experience to operate using computer system. They started only this year computerization of the data. Under those conditions, it is quite appropriate to have technical assistance in order to have smooth operation after completion of this facility. Therefore the field of technical assistance will be soft assistance of following two fields.

1. Logistics Management Engineer: Guidance of inventory control system by computer
2. Software Engineer: Development of software for inventory data control

2-3 Basic Design

2-3-1 Design Concept

(1) Facility Project Aspect

1) Facility Layout and Zoning Plan

In the facility planning of the project, the facility layout plan and the facility zoning plan will be drawn up, taking the future expansion of the facility into consideration. The security box and the gate will be provided at the entrance to the construction site, considering the security of the facility. The parking lot and the space for the 7.5t trucks and the trailers to load / unload medical goods will be kept in the front yard.

2) Environment Countermeasure

In selecting the finish materials, the jointless metal panel method with heat insulation material will be adopted in consideration to the weather of high temperature, high humidity and heavy rains. The eaves will be effectively provided at the window in order to avoid the strong sunshine.

The roof and the wall of the store rooms will be heat-insulated and the ventilation system for exhausting heat will be provided at the highest part of wall along with the skylight for inducing the minimum sunlight.

The handling area will have natural ventilation and natural lighting systems.

3) Floor Plan and Flow Diagram

In the planning of the area or the specification of each rooms, a little larger dimension will be adopted as the standard and as the affordable rooms, in consideration of Fijian standard body dimension.

Especially in the daily working area like Bulk Stores and the handling area, the working dimension between the Pallet Racks and of the forklifts will be determined, considering the larger standard dimension of Fijians, as well as the dimensions of issuing racks in the Issuing Store and of office areas.

4) Sectional Plan

The Bulk Store containing four-shelf pallet racks will keep the two-story height in the store division. The handling division will keep the one-and-half height, considering the ventilation and the traffic of the forklift. The Issuing Store containing the itemized drugs will keep the ordinary office ceiling height, and the administration division will be located above it (on the second floor). The first floor will be approximately 1 meter elevated from the ground level, considering the loading level from trucks and in order to overcome the natural conditions such as high temperature and high humidity.

Main Rooms of the first floor

Bulk Store 1,2, Issuing Store 1,2,3, Issuing Store for BPS, and other Stores as Store Division, Receiving Area, Dispatching Area, Sorting Area, Receiving Office, Dispatching Office, Issuing Office as Handling Division, Warehouse Manager Office, BPS Office as Administration Division will be provided.

Main Rooms of the second floor

Administration Office, Chief Pharmacist Office, Assistant Chief Pharmacist Office, Procurement Office, IRA Office, BED Office, Computer Room as Administration Division, Conference Room, Library as Common Space will be provided.

5) Required Divisions and Rooms

Store Division

The medical drugs will be categorized as follows, and the appropriate containing quality will be maintained.

a. Bulk Store

Among received medical goods, the bulk unit goods will be stored and controlled with the “pallet” on the “pallet rack”.

b. Issuing Store

Among received medical goods, the itemized drugs and goods will be stored and controlled in the “issuing rack”.

c. Other Stores

The other stores, such as Cold Store, Flammable Store, Dangerous Drug Store and Miscellaneous Store will meet the characteristics of each drugs.

Handling Division

The spaces for the effective sorting, handling and packing will be kept, as the medical goods will be received and dispatched by trucks.

a. Receiving Area

The space will be kept for loading the received medical goods on the pallet.

b. Sorting Area

The space will be kept for distributing the medical goods loaded on the pallet to each stores.

c. Packing Area

The working space will be kept for packing the medical good for delivery.

d. Dispatching and Holding Area

The spaces will be kept for holding medical delivery goods temporarily and for loading into delivery trucks.

Administration Division

The administrative and operational rooms will be provided as the administration division of this center. The existing facility involves the function of the other sections of Fiji Pharmaceutical Services (FPS), in addition to the delivery function of medical goods. The target is, being the facility as one part of FPS, by integrating the relating divisions such as BED (Business and Essential Drugs Branch) and IRA (Inspectorate and Regulatory Affairs Branch) in the new Fiji Pharmaceutical Services Center, and by overcoming the handicap of shortage of human resources in Fiji, to implement the stabilized supply of medical goods more effectively. Therefore, the administrative division of this center will be organized as follows.

a. Medical Supply Division

Warehouse Manager Office, Administration office, BPS Office, Receiving Office, Dispatching Office

b. FPS

Chief Pharmacist Office, Assistant Chief Pharmacist Office, BED Branch Office, IRA Branch Office

Miscellaneous

a. Common Division

Entrance, Reception, Conference Room, Toilets, Locker Rooms, Corridor, Storages

b. The Other Spaces

Security Room, Worker's Room, Janitor's Room, Mechanical Room, Electrical Rooms

6) Environment Setting for the Storage Division

The environment for the storage division will be settled as follows, in order to maintain the quality of medical goods and to store safely and effectively. In the settling the environment, the mechanical equipment will be minimized to suppress the maintenance and running cost.

Table 2-23 Table of Environment in the Storage Division

Rooms	Forklift Running	Dustproof	Prevention of Temperature Rising			Chiller	Refrigerator
			Air Conditioning	Mechanical Ventilation	Natural Ventilation		
Bulk Store 1	○			○			
Bulk Store 2	○		○				
Issuing Store 1		○		○			
BPS Issuing Store 1		○		○			
Issuing Store 2		○	○				
BPS Issuing Store 2		○	○				
Issuing Store 3				○			
Cold Store 1		○				○	
Cold Store 2		○				○	
Refrigerator Space				○		○ Equip	○ Equip
Flammable Store				○			
Dangerous Drug Store		○		○			
Miscellaneous Store	○			○			
Emergency Store				○			
Passage	○				○		

(2) Equipment Plan

The basic policy in selecting the equipments is as follows

- 1) The contents should match the activity plan of the Center.
- 2) The scope should match the contents of activity for the Center.
- 3) Easy operation, high durability and easy maintenance equipment plan
- 4) Equipment plan in consideration of the coordination to the facility planning
- 5) The equipment attached to the building will be eliminated from the equipment list and will be involved in the facility planning.

(3) Soft Component

The basic policy in making up the soft component is as follows

- 1) The plan should take full consideration to the technology level of the recipient.
- 2) The plan should be the appropriate one, matching the contents of the concrete services of the recipient.
- 3) The contents should enable the recipient to develop fully and independently after the completion of the project.
- 4) The content should consider the future operation plan.

2-3-2 Basic Plan

(1) Facility Layout Plan

- 1) The truck yard large enough for trucks and trailers to enter and park will be kept in the front area of the site, which faces the front road. The paving surface will be the asphalt to deal with heavy vehicles.
- 2) The facility will be located in the middle of the site, and the western part of the site will be the extra space for the future expansion of the facility.
- 3) The in-site roads will be kept in the perimeter of the site, and the grass and low trees will be planted in consideration of peripheral environment. (Landscape planting works will be done by Fiji side.)

(2) Facility Plan

- 1) Facility contents and the calculation of the size

Table 2-24 Table of Calculated Areas

Division	Rooms	Existing			Requirement			Planned Floor Space			Basic Unit	Remarks
		Number	Area	Total	Number	Area	Total	Number	Area	Total		
S T O R E D I V I S I O N	Bulk Store 1	1	514	514	1	623	623	1	1336	1336		
	Bulk Store 2	1	374	374	1	845	845	1	223	223		
	Miscellaneous Store	1	167	167			0	1	191	191		"Bulk Store 3" in the existing warehouse
	Emergency Store	1	1278	1278			0	1	51	51		"Bulk Store 4" in the existing warehouse
	Total 1			2333			1468			1801		
	Issuing Store 1	1	136	136	1	983	983	1	365	365		
	BPS Issuing Store 1							1	34	34		
	Issuing Store 2	1	336	336	1		0	1	41	41		
	BPS Issuing Store 2							1	30	30		
	Issuing Store 3							1	70	70		
	Total 2			472			983			540		
	Cold Store 1	1	14	14	1	66	66	1	50	50		
	Cold Store 2	1	14	14	1	23	23	1	12	12		
	Refrigerator Space							1	14	14		
	Flammable Store	1	18	18	1	26	26	1	41	41		
	Dangerous Drug Store	1	3	3	1	26	26	1	9	9		
	Total 3			49			141			126		
	Passage	1	142	142	1	205	205	1	311	311		
	Total			2996			2797			2778		
H A N D L I N G D I V I S I O N	Receiving Area	1	96	96	1	303	303	1	210	210		Receiving Div. 3 Person
	Receiving Office	1	21	21	1	8	8	1	17	17	5.7	Receiving Div. 2 Officers, 1 Person
	Quarantine	1	9	9	1	22	22	1	7	7		
	Sorting Area	1	34	34	1	196	196	1	287	287		
	Issuing Office	1	19	19	1	10	10	1	47	47	5.9	Receiving Div. 4 Person Dispatching Div. 4 Person
	Packing Area	1	19	19	1	77	77	1	105	105		
	Dispatching Area	1	43	43	1	311	311	1	109	109		Dispatching Div. 3 Person
	Holding Area	1	34	34	1	76	76	1	103	88		
	Dispatching Office	1	17	17	1	10	10	1	23	23	7.7	Dispatching Div. 2 Officers, 3 Person
		1	113	113								Raw Material Room
	Total			405			1013			893		

Division	Rooms	Existing			Requirement			Planned Floor Space			Basic Unit	Remarks
		Number	Area	Total	Number	Area	Total	Number	Area	Total		
ADMINISTRATION	Chief Pharmacist Office	1	28	28	1	36	36	1	42	42		Chief Pharmacist 1 Person
	Assistant Chief Pharmacist Office	1	13	13	1	22	22	1	32	32		Assistant Chief Pharmacist 1 Person
	Procurement Office			0	1	25	25	1	42	42	10.5	Procurement Div. 1 Head, 3 Person
	BED Branch Office			0	1		B / D	1	39	39	9.8	BED Branch 1 Head, 3 Person
	IRA Branch Office			0	1		B / D	1	42	42	9	IRA Branch 1 Head, 4 Person
	Administration Office	1	54	54	1	65	65	1	79	79	11.3	Admin. Div. 1 Officer, 3 Person, Store Div. 3 Officers
	Computer Room			0	1		B / D	1	20	20		
	Server Room							1	19	19		
	BPS Office	1	23	23	1	21	21	1	44	44	14.7	BPS 2 Officers, 1 Person
	Supervisor Office			0	1		B / D	1	34	34		Warehouse Supervisor 1 Person
	Conference Room			0	1	113	113	1	116	116		Divided with Removable walls
	Library			0	1	12	12	1	39	39		
				0	1	26	26					Quality Test Room
	Total			118			320			548		
COMMON SPACE	Entrance Hall 1	1	13	13	1	17	17	1	17	17		
	Entrance Hall 2	1	13	13	1	48	48	1	23	12		
	Rest Corner 1			0	1	30	30	1	28	28		
	Rest Corner 2							1	41	41		
	Men's Toilet (Admin.)	1		0	1		0	1	25	25		
	Men's Locker Room				1	23	23	1	32	32	1	40 Person
	Women's Toilet (Admin.)	1		0	1		0	1	16	16		
	Women's Locker Room				1	10	10	1	18	18	0.9	20 Person
	Men's Toilet (Store.)	1	13	13	1	23	23	1	26	26		
	Women's Toilet (Store.)	1	6	6	1	10	10	1	16	16		
	Men's Toilet (1F)							1	5	5		
	Women's Toilet (1F)							1	5	5		
	Toilet for Disabled							1	6	6		
	Security Room			0	1		B / D	1	18	18		Security Div. 2 Person
	Worker's Room			0	1		B / D	1	9	9		Maintenance Div. 2 Workers, 3 Drivers
	Janitor's Room			0	1		B / D	1	6	6		Maintenance Div. 2 Janitors
	Machine Room 1			0	1	64	64	1	85	85		
	Machine Room 2							1	13	13		
	Power Room	1	9	9	1	64	64	1	138	138		
	Corridor, etc	1	242	100	1	314	113	1	469	469		Trash Box: 40m ² , Security Box: 14m ²
	Total			154			402			985		
	Grand Total			3673			4532			5204		Warehouse :5150 m ²

B / D = Required at the Basic Design Study Meeting

2) Floor Plan

Store Division

a. Bulk Store

i. Bulk Store 1

The Bulk Store 1 is the main part of the building for containing the medical goods delivered in “Bulk” unit. The containing quality will be maintained by introducing ‘the pallet rack and the forklift’ administration method. The Bulk Store 1 contains medical goods controllable under the ordinary temperature.

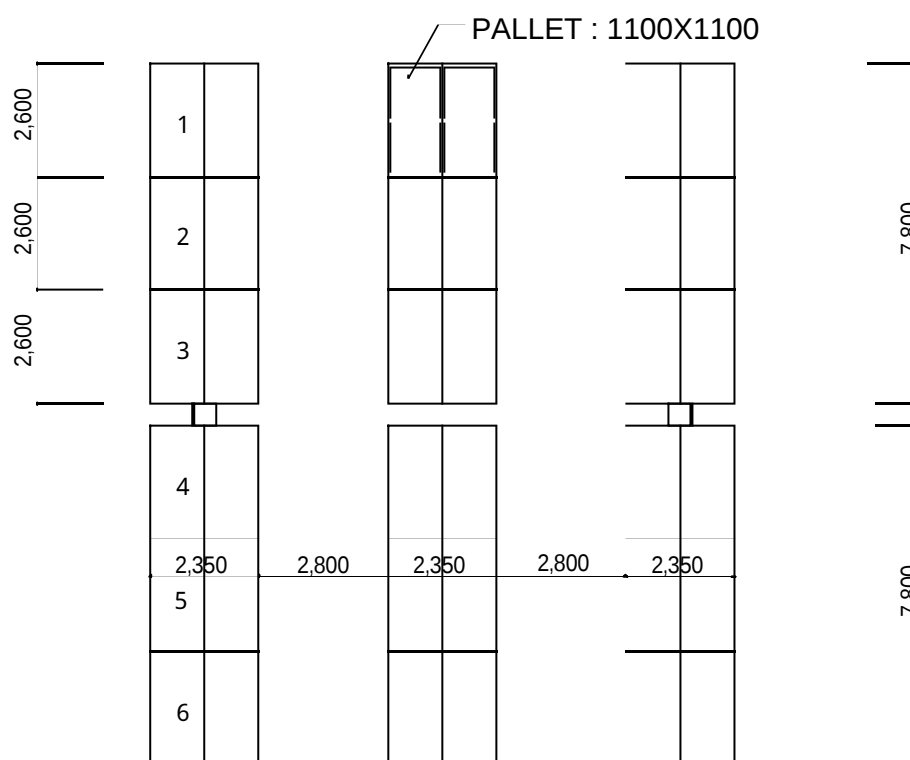


Figure 2-5 Bulk Store 1 Module Plan

- The module dimension will be as follows: the total depth of pallet racks will be 2.35m and the width of the passageway for electrical forklifts will be 2.8m(effective width for loading pallets 2.65m + clearance 0.15m), and the racks will be four-story high.
- More than 1174 pallets (total of required 1079 pallets according to the volume calculation of containing medical goods plus 95 pallets for temporary containing) will be contained.

ii. Bulk Store 2

The Bulk Store 2 is the containing space of medical goods, which needs to be

contained under the air-conditioned condition.

- The pallet racks will be three-story high.
- More than 166 pallets (total of required 156 pallets according to the volume calculation of containing medical goods plus 10 pallets for temporary containing) will be contained.

b. Issuing Store

i. Issuing Store 1

The Issuing Store 1 is the space for containing the itemized medical goods from the bulk unit temporarily, where the storemen gather goods by picking them from the issuing rack into “picking cart”, based on the payment slips.

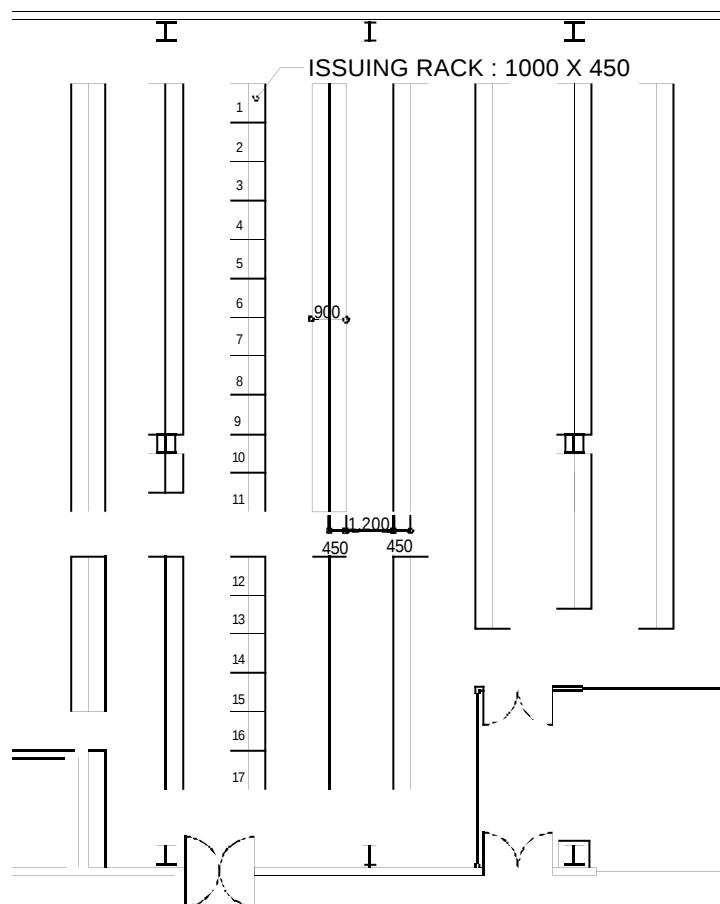


Figure 2-6 Issuing Store 1 Module Plan

- The module dimension of the store will be as follows: the total depth of the racks will be 0.9m and the width of the passageway will be 1.2m(the width of picking cart 0.5m + working space for employees 0.7m), and the racks will be four-story high.
- More than 1301 shelves as the calculated necessary number of 1261 shelves plus buffer number of 40 shelves will be provided as the Issuing Rack. (The lacking shelves will be stored in the Issuing Store 3.)

ii. Issuing Store 2

The Issuing Store 2 contains drugs which should be contained under the air-conditioned condition for 24 hours a day.

- More than 119 shelves will be contained as the total number of calculated necessary number of 115 shelves plus buffer number of 4 shelves.

iii. Issuing Store 3

The Issuing Store 3 is the space for containing medical goods under the ordinary temperature as well as the Issuing Store 1.

- Total number of 1301 shelves will be provided including the shelves not contained in the Issuing Store 1.

c. BPS Issuing Store

i. Issuing Store 1

BPS Issuing Store 1 is the space specified for BPS, adjacent to and accessible from BPS office.

- More than necessary 80 shelves will be provided.

ii. Issuing Store 2

The Issuing Store 2 contains drugs which should be administrated under the air-conditioned condition for 24 hours a day.

- More than necessary 90 shelves will be provide.

d. The Other

i. Cold Store

■ Cold Store 1

The Cold Store 1 contains the medical goods (category A: drugs and category X: radiology) which should be contained under chilled temperature (0 – 8) for 24 hours a day.

- More than 139 shelves will be contained as the total number of calculated necessary number of 131 shelves plus buffer number of 8 shelves.

■ Cold Store 2

The Cold Store 2 contains the medical goods (category V: Vaccines) which should be contained under chilled temperature (0 – 8) for 24 hours a day and should be administratively divided with wire net from the Cold Store 1.

- More than 9 shelves will be contained as the total number of calculated necessary number of 8 shelves plus buffer number of 1 shelf.

ii. Flammable Store

The Flammable Store contains flammable medical goods and dangerous drugs such as alcohol.

- More than 93 shelves will be contained as the total number of calculated necessary number of 86 shelves plus buffer number of 7 shelves.

iii. Dangerous Drug Store

The Dangerous Drug Store contains medical goods, such as narcotic, which needs individual storing and management from other drugs.

- More than 24 shelves will be contained as the total number of calculated necessary number of 22 shelves plus buffer number of 2 shelves.

iv. Miscellaneous Store

The Miscellaneous Store will be the space for containing bed, mattress and so forth, which could not be contained on the uniform bulk pallet size. The spare pallets for moving and containing medical goods will also be stored.

- The space for 30 beds (and mattress – placed flat on the floor) and 40 spare pallets will be kept.

v. Emergency Store

The Emergency Store contains the medical goods for emergent demand such as natural disaster and epidemic.

- The space for the calculated 68 shelves will be kept.

Handling Division

a. Receiving Area

The Receiving Area is the space for receiving and unloading medical goods delivered to the center by trucks, and for loading on the pallets for containing in the Stores.

- The space will be kept for placing about 30 pallets, which is the average volume of receiving medical goods at one time.

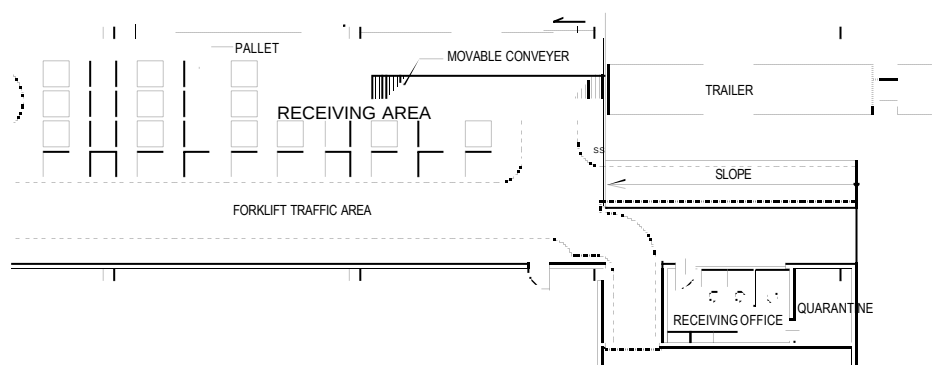


Figure 2-7 Receiving Area Plan

b. Receiving Office

The Receiving Office is the room for administrative work of checking the item, quantity, and the expired date of the medical goods unloaded at the receiving area, in reference to the invoice.

- The space for 3 personnel will be kept.

c. Sorting Area

The Sorting Area is the working space for sorting the medical goods loaded on the pallets either to Bulk Store or to Issuing Store, and the passage for distributing pallets by forklifts.

- The passage for forklifts will be kept as in the plan below.

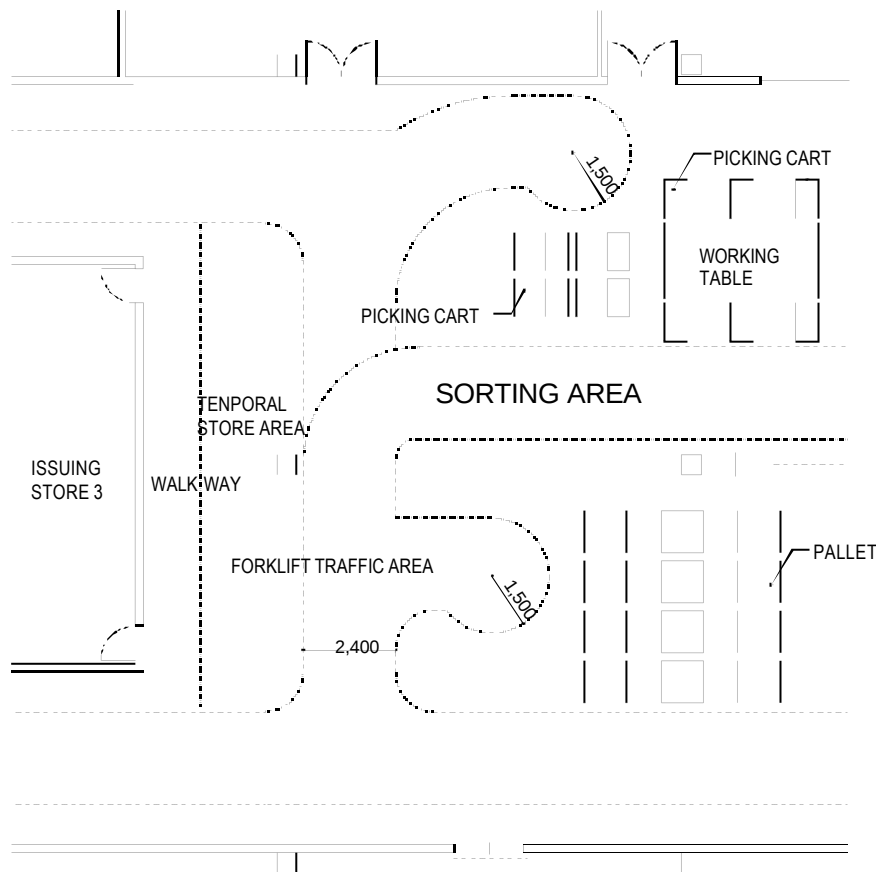


Figure 2-8 Sorting Area Plan

d. Issuing Office

The Issuing Office is the working space for the personnel who make records of in – out of medical goods contained in the Issuing Store.

- The space for 8 personnel will be kept.

e. Packing Area

The Packing Area is the working space for packing medical goods picked from the Issuing Store into the corrugated cardboard box for delivery.

- Two work tables of 3m x 1.5m will be placed, and the space for packing and the passage zone of forklifts will be kept around the table.

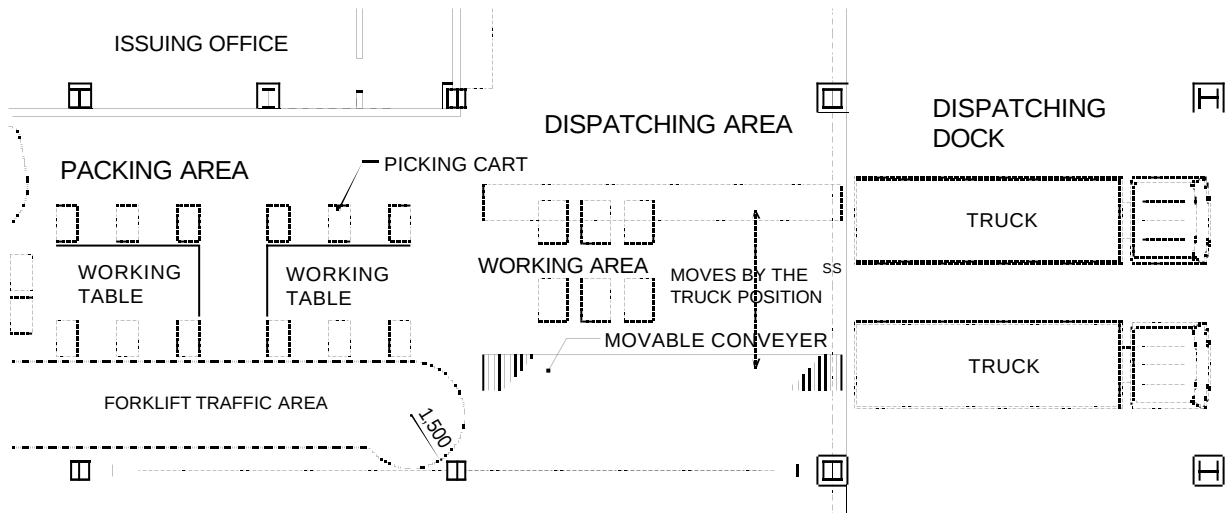


Figure 2-9 Packing & Dispatching Area

f. Dispatching Area

The Dispatching Area is the space adjacent to the truck dock for loading medical goods onto the trucks.

- The space for loading the volume of about 20 rolling box - pallets at one time will be kept. The loading of medical goods to the truck will be handled with the movable conveyer.

g. Holding Area

The Holding Area is the temporary containing space for the pallet-loaded medical goods until the loading onto the truck begins.

- The space for 20 rolling box pallet will be kept for dispatching at one time.

h. Dispatching Office

The Dispatching Office is the working space for checking the item and quantity of medical goods to be loaded onto trucks and for proceeding with the payment slip.

- The space for 5 personnel will be kept.

Administration Division

a. Chief Pharmacist Office

Chief Pharmacist Office is the office for the Chief Pharmacist, who is the person in charge of FPS.

- The space for Chief Pharmacist's desk, sofa and table will be kept.

b. Assistant Chief Pharmacist Office

- The space for Assistant Chief Pharmacist's desk, meeting table will be kept.

c. Procurement Office

The Procurement Office is the room for the personnel of the procurement division directly belonging to the Chief Pharmacist.

- The space for 4 personnel will be kept.

d. BED Office

The BED Office is the branch office of the BED (Business and Essential Drugs Branch), who announces the information on stocks and adverse reaction of drugs to hospitals for the stable supplying the medical goods. This office will be placed in the FPSC in order to plan the more effective operation, since this division has many connected work with FPSC.

- The space for 4 personnel (one of them is for future plan) will be kept.

e. IRA Office

The IRA Office is the branch office of the IRA (Inspectorate and Regulatory Affairs Branch), who deals with the drug policy and approves the imported drugs. This office will be placed in the FPSC in order to plan the more effective operation, since this division has many connected work with FPSC.

- The space for 5 personnel will be kept.

f. Administration Office

The Administration Office is the office for the operational and administrative personnel of the overall, who deal with labor, record, salary issues of the organization.

- The space for 7 personnel will be kept.

g. Computer Room

The Computer Room is the room for placing the personal computers and the server to be used for the Store Management System.

- The personal computers, server and the copying machine, etc. will be placed.
- The Server Room will be one independent room that can be locked for the security aspect.

h. BPS Office

The BPS Office is the room for hand-over of the medical goods by FPSC bulk purchase scheme to the buyers from PIC, and to the domestic pharmacies or private hospitals in Fiji, and for packing the medical goods picked and gathered from the Issuing Store, and for business talks and receiving medical goods. Since this room is used for the international business deals, it is administratively separated from other rooms of Fijian domestic offices.

- The room for 3 personnel and working and greeting space will be kept.

i. Warehouse Manager Office

The Warehouse Manager Office is the room for the Warehouse Manager, who will stay as the manager for the usage of whole facility and will be responsible for the drug robbery case.

- The space for desk, sofa and table, security alarm monitors will be kept.

j. Conference Room

The Conference is the air-conditioned room for the usage of 40 personnel. It will be used for the conference or training of the personnel, such as middle management meeting, all staff meeting, pharmacist meeting responsible for different areas.

- The Conference room for 40 personnel will be kept.
- This room can be divided into two rooms by the usage of removable walls.

k. Library

The Library is the room for storing the books such as employee training manual, and medical magazines, etc.

- Store space for about 500 textbooks ,300 technical books and of browsing corner will be kept.

Common Division

Approximately 985 sq. meters (Approx. 19 % of the total floor area) will be kept for other spaces. The rooms are: men's toilet & locker room (administration division), women's toilet & locker room (administration division), men's toilet (store division), women's toilet (store division), and the other common space such as, entrance, rest corner, corridor , mechanical room, electricity room, security room, worker's room and janitor's room.

3) Sectional and Elevation Plan

Sectional Plan

a. The settlement of the ground level

The height difference between the west part of the site (+2.5) and the east part facing the front road (+1.6) deems 0.9 meters. The designed earth level (DEL) will be planned at +1.8 meters, considering the entry of delivery trucks of medical goods and cars, and the drainage of rainfall. The level of the first floor will be DEL+1.0m, considering the height of truck's loading floor, and for overcoming the natural condition of high temperature and humidity.

b. The decision of the height of each floor

As the measure to decide the height of each floor, the bulk store will be the high ceiling space – one story room as it functionally needs the enough height for containing the pallet racks. The Issuing Store requires the same height as the ordinary office room, and is located on the first floor. The administration division such as administration office and the conference room will be located on the second floor.

The floor height is decided as follows:

Floor height = the highest ceiling height (or other condition) + height of beam + space for air-conditioning duct or electrical conduit

i. Bulk Store 1

The Pallet Rack consists of 4 shelves with effective 1.5m height each. The clearance above the bulk unit should be kept more than 1.0m and the beam height will be 0.9m. Therefore, the height above the beam (or the eave height at lower roof level) will be 8.0m in total.

ii. The First Floor

The height of Issuing Store and the BPS office 2.8m + height of beam, slab

thickness 1.1m + ceiling 0.2m = 4.1m floor height of the first floor.

iii. The Second Floor

The height of Conference Room 2.8m + height of beam 0.9m + ceiling 0.2m = 3.9m floor height of the second floor. (lower roof level)

iv. Sorting Area

The maximum height of trailer 4.25m + height of beam 0.5m + clearance under beam 0.5m = 5.25m eave height at the truck dock. The highest roof height 5.2m + height of window grill 2.4m + height of beam 0.9m =8.5m: the highest height at the Sorting Area.

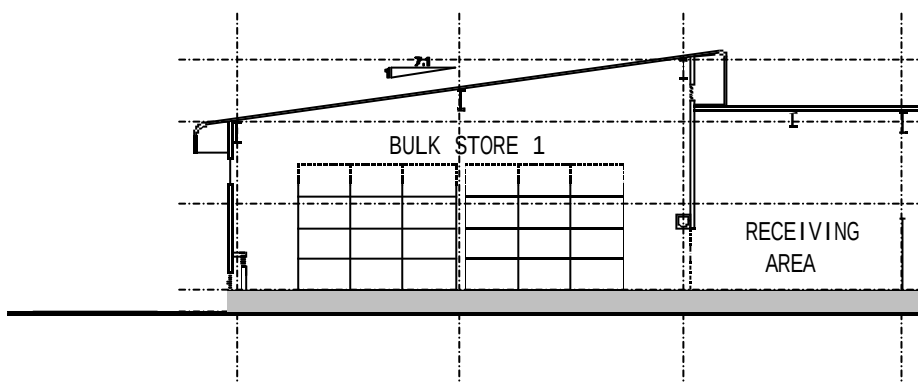


Figure 2-10 Section of Bulk Store 1

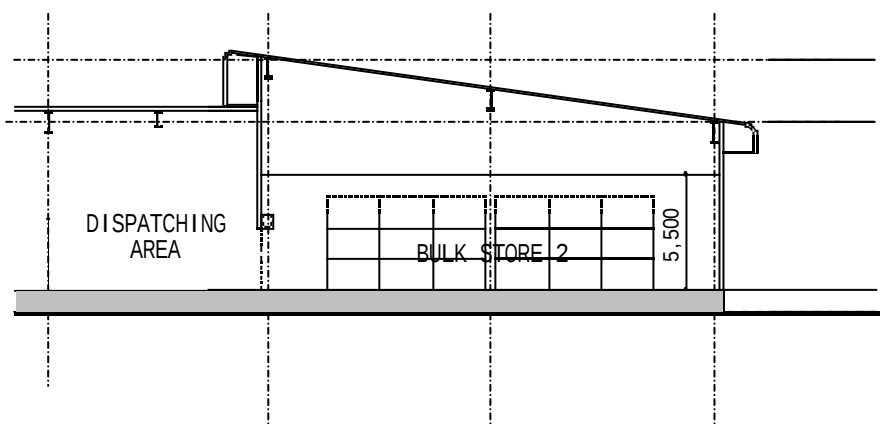


Figure 2-11 Section of Bulk Store 2

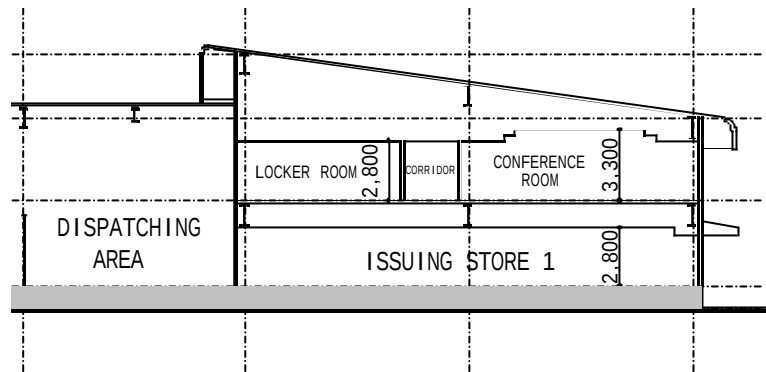


Figure 2-12 Section of Issuing Store 1 and Administration Division

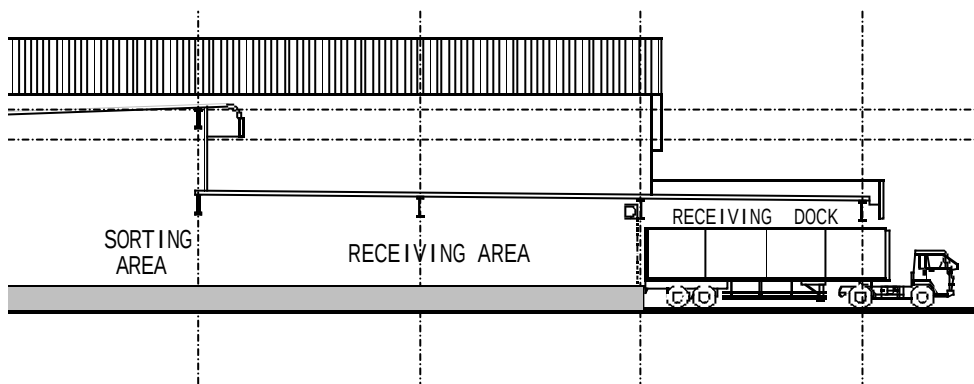


Figure 2-13 Section of Receiving Area

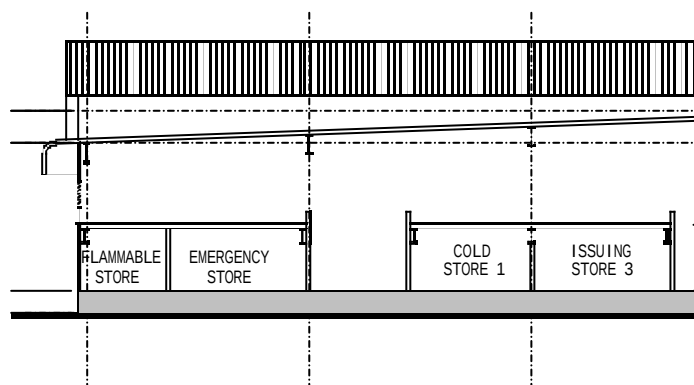


Figure 2-14 Section of Stores

Elevation Plan

a. East Elevation

The east elevation facing the front road, being the façade of this facility, will be the modern and graceful design suitable for the Fiji Pharmaceutical Services Center.

b. North and South Elevation

The north elevation faces the site boundary, and the south elevation faces the future road. By settling the eave height comparatively low at DEL + approx. 7.5m (second floor level), elevation design will be kept to reduce the sense of oppression to neighborhood. The second floor consists of administrative rooms, and thus windows will be continuous and horizontally emphasized design.

The south elevation, being the exterior wall of the Bulk Store, is supposed to be monotonous, though the windows for sun light are provided under the eave. By planting the grass and low /middle trees between the future road and the wall, the sense of oppression by the building will be reduced, and the peripheral area (the opposite site beyond the future road is supposed to be sold to private) will be environmentally beautified.

4) Finish Schedule

Table 2-25 Finish Schedule

Portion		Finish		
Exterior	Roof	Corrugated Steel Panel (Baked Fluorine Finish) + Heat Insulation		
	Exterior Wall	Corrugated Steel Panel (Baked Fluorine Finish) + Heat Insulation		
	Doors & Windows	Alluminum Sash, Steel Doors, Wooden Doors		
	Parking Lot	Asphalt Paving		
	Room	Floor	Wall	Ceiling
Store Division	Bulk Store 1	Concrete Trowel Finish + Durability Resin	Painting	No Ceiling
	Bulk Store 2	Ditto	Ditto	Calcium Silicate Board
	Miscellaneous Store	Ditto	Ditto	No Ceiling
	Emergency Store	Ditto	Ditto	No Ceiling
	Issuing Store 1, 2, 3	Ditto	Ditto	Gypsum Board
	Flammable Store	Ditto	Ditto	No Ceiling
	Dangerous Drug Store	Ditto	Ditto	Gypsum Board
Handling Division	Receiving Area	Ditto	Ditto	No Ceiling
	Receiving Office, Quarantine	Tile Finish	Ditto	Gypsum Board
	Sorting Area	Concrete Trowel Finish + Durability Resin	Ditto	No Ceiling
	Issuing Office	Tile Finish	Ditto	Gypsum Board
	Packing Area, Holding Area, Dispatching Area	Concrete Trowel Finish + Durability Resin	Ditto	No Ceiling
	Dispatching Office	Tile Finish	Ditto	Gypsum Board
Administration Division	Chief Pharmacist Office	Ditto	Wood Panel	Rockwool Board
	Assistant CP Office	Ditto	Painting	Ditto
	Offices	Ditto	Ditto	Ditto
	Administration Office	Ditto	Ditto	Ditto
	Computer Room	Ditto	Ditto	Ditto
	Supervisor Office	Ditto	Ditto	Ditto
Common Space	Entrance 1, 2	Ditto	Ditto	Ditto
	Rest Corner	Ditto	Ditto	Ditto
	Conference Room	Ditto	Wood Panel	Ditto
	Library	Ditto	Painting	Ditto
	Toilets	Ditto	Tile	Calcium Silicate Board
	Locker Room	Ditto	Painting	Ditto
Others	Security, Janitor's Room	Ditto	Painting	Gypsum Board
	Machine, Power Room	Concrete Trowel Finish + Durability Resin Coating	Rockwool Mat	No Ceiling

5) Disaster Prevention Plan

The emergency staircases will be located at each ends of the building in case of fire and for early sensing and two-way evacuation. The Store and the Sorting Area of the first floor will be also the simple and see-through rectangular plan, and will avoid the dead end of corridor or the blind corner. Basic laws will be dependent on the National Building Code for Fiji (NBCF), however, the Building Standard Law of Japan (BSLJ) will be adopted unless otherwise specified in NBCF.

Evacuation Accommodation

Emergency Staircases will be located within 40 meters distance from each other. Two emergency stairs will be located at each ends of the administration division on the mezzanine floor in this plan. Although the Bulk Store 1 is located on the ground floor, one emergency door will be provided in the exterior wall, as the evacuation route is considerably long.

Fire Compartment

The major room will be divided with fire walls in every 1500 sq. meters. Although the Sorting Area will be regarded as semi-outdoor space, the Bulk Store 1 will be independently covered with fire wall, since the area exceeds 1340 sq. meters. The inner wall of Bulk Store 2 and Issuing Store 1 facing the Sorting Area will be regarded as the exterior and be specified as the non-combustible wall. The fire shutters will be provided at the entrance of the Bulk Store 1 & 2, and smoke sensors will also be installed (based upon the Building Standard Law of Japan).

Main Structural Material

The materials of main part of the building, such as column, beam and exterior wall should be non-combustible, which is equivalent to the Japanese B Grade Quasi-Fire Resisting Building (based upon the Building Standard Law of Japan), though the fire – resistant specification is exempted based on the purpose (class 7 : storage) and the size (type C : 2 stories) of the building.

Smoke Exhausting System

The smoke exhausting system for the Bulk Store will be mechanical ventilation system utilizing ventilation fans. The smoke exhausting system for the administration offices will be the natural ventilation system to exhaust smoke from the windows.

Fire Alarm System

Automatic Fire Alarm system will be provided inside the building.

Fire Extinguishing Equipment

Indoor Fire Hydrant will be provided inside the building by MOH.

(3) Structural Planning

1) Planning Standard and Load Conditions

Earthquake load and the wind load will follow the National Building Code of Fiji 1990. As Fiji is located in the Pacific Earthquake Zone and the hurricane – hit zone the same as Japan, the earthquake load is planned at 50 %, the wind load is planned at 150 % of the load specified in the Building Standard Law of Japan. Live load will be dependent upon Japanese Law, and the detail is specified in the article 5).

2) Foundation Plan

According to the geological survey report, the construction site was the swamp near the mouth of the river, which was reclaimed some 6 – 10 years ago. The earth is comprising of layer of FILL to the depth of 2m, alluvial sediments of 1 to 7m, and the hard grey silts – Suva Marl underneath. The upper part of Suva Marl is weathered and the soil beneath 12 to 17m is quite hard.

Since the alluvial beneath the reclaimed FILL is quite soft and weak, the building foundation will be approximately 8 meter long pier foundation reaching to the Suva Marl as the supporting layer. The ground settlement of approximately 5 cm is predicted in the report due to the settlement of remaining FILL in the future. Since the underground water level is as shallow as 1m deep, the bottom of foundation should be designed as shallow as possible.

3) Structure Classification

The structure of this facility will be steel structure, considering that the usage of the facility is distribution center and the spanning module is comparatively long 10.5m x 10.6m, and that the site condition requires pier foundation, and for the reason to reduce the overall load of the building.

4) Framing Plan

The framing plan will be the brace system utilizing the X-direction walls. The direction at right angles will be the Rahmen Structure, since there are few walls provided with structural braces. The parts of both column and beam will be H-shape steel available in the peripheral countries. The first floor slab is 1 meter elevated from the ground surface, and will be the structural slab as the space beneath the slab is to be void.

5) Design Load and Calculation Policy

The earthquake load will be dependent on the Fiji standard, but the safety coefficient against the earthquake will be increasingly considered. The wind load is also dependent on the Fiji Standard in order to reflect circumstances of Fiji. The live load and the calculation formula will be upon the Japanese Building Standard, which is more usable and reliable. In addition, by limiting the eccentricity by the earthquake load within the permissible figure, the secondary earthquake design will be omitted.

The base sheer coefficient for the primary design will be dependent on the Fiji Standard.

Lateral force coefficient $C = C_h(T, 1) \cdot S_p \cdot R \cdot Z \cdot L_s$

$C_h(T, 1) = 0.80$; Basic seismic hazard acceleration coefficient

($T=0.3$ sec, Intermediate soil sites)

$S_p=0.67$; Structural performance factor

$R=2.0$; Risk factor (Earthquake Safety Coefficient: the maximum figure by Fiji standard is 1.3, which will be increased this time.)

$Z=0.9$; Zone factor

$L_s=1/6$; Limit state factor (for Serviceability)

The figure C will be calculated as 0.107, which will be rounded as $C=0.1$. This base sheer coefficient is equivalent to 50 % of Tokyo Standard.

Wind Load

The wind load will be dependent on Fiji standard.

Design wind speed $V_z = V \cdot M(z, cat) \cdot M_s \cdot M_t \cdot M_i$

$V=57\text{m/s}$; Basic wind speed (for permissible limit state)

$M(z, cat)=1.00$; Terrain and structure height multiplier

(Terrain category 2, Height=10m, Region C)

$M_s=1.0$; Shielding multiplier (no shielding)

$M_t=1.0$; Topographic multiplier (flat site)

$M_i=1.1$; Structure importance multiplier (maximum figure)

The figure V_z will be calculated as 62.7m/s, therefore,

Wind pressure $Q_z = 0.6 \cdot V_z^2 = 2360 \text{ N/m}^2$

This wind load is equivalent 1.5 times as Tokyo.

Live Load

The live load for the Bulk Store and Receiving / Dispatching Area will be set as follows:

The live load for other spaces will be set in reference to the Japanese Standard.

Load of one shelf of Bulk Store (2 pallets)= pallets 2t + rack 0.5t = 2.5t

Live load for slab in Bulk Store = $25000\text{N} \times 4 \text{ shelves} \times 4 / (5.25 \times 5.3) \text{m}^3$

=14400 → 15000N/m³

Earthquake Load for Bulk Store = $25000\text{N} \times 4 \text{ shelves} \times 12 / (10.5 \times 10.6) \text{m}^2$

=10800 → 11000N/m²

Pallet load for Receiving / Dispatching Area + Holding Area = Approx.1.2t/ pallet

Live load for slab in Receiving / Dispatching Area = $12000\text{N} \times 12 / (5.25 \times 5.3) \text{m}^2$

=5200 → 5500N/m²

Earthquake Load for Receiving / Dispatching Area = $12000\text{N} \times 32 / (10.5 \times 10.6) \text{m}^2$

=3500 → 3500N/m²

In addition, the live load for framing is set as the intermediate figure of the above calculated. The table of live loads is shown in the next page.

Table 2-26 The Table of Live Loads

Floor	Room	Live Load (N/m ²)			Remarks
		Floor	Frame	Earthquake	
1	Bulk Store 1,2	15000	13000	11000	Forklifts running
	Issuing Store Cold Store Flammable Store	8000	7000	5000	Equivalent to Stock Room
	Miscellaneous Store	8000	7000	5000	Forklifts running Equivalent to Stock Room
	Receiving Area Dispatching Area Holding Area Sorting Area Passage	5500	4500	3500	Forklifts running
	Offices Security Room Entrance, Toilets	3000	1800	800	
	Offices Conference Room Toilets, Locker Room	3000	1800	800	
2	Library	8000	7000	5000	Equivalent to Stock Room

6) Structural Material

Concrete : Will be ordinary concrete or ready mixed concrete available near the site

Steel Bar: Will be imported from the peripheral countries or from Japan

Steel Frame: Will be imported from the peripheral countries or from Japan

Pile: Will be the pre-cast concrete pile available at the site or will be imported from the peripheral countries or from Japan

7) Paving Plan

In-site paving section setting will be dependent upon the Asphalt Pavement Specification of Japan Road Association. The traffic volume will be Traffic A. The paving CBR figure will be 5 %, according to the Geological Report. Since the surface 50 cm is soft and weak, the total thickness of paving will be more than 50 cm.

(4) Air Conditioning and Ventilation Facilities Plan

1) Air Conditioning Facilities Plan

The air-conditioned area will be limited to the minimum area to suppress the maintenance cost, and the most effective air-conditioning system will be adopted. The part of Bulk Stores and Issuing Stores, as the main part of this facility, which contain the drugs under the specified temperature, will be air-conditioned.

Design Condition

Since the site is located in the tropical zone of high temperature and high humidity, the air-cooling system will be required throughout the year. Also, the humidity-eliminating measures will be necessary, considering the high humidity.

Air Conditioning System

The natural ventilation will be designed as the principle, and the minimum number of rooms will be equipped with air-cooling machines. Considering the maintenance and trouble of the machine, the separate system will be adopted in principle.

The rooms requiring the air conditioning will be shown as follows:

Table 2-27 Table of Air-Conditioned Rooms

Floor	Room	Air-Conditioning System	Remarks
1	Bulk Store 2	Air-Source Separated Cooler	25 °C-24hr running
	Issuing Store 2	Air-Source Separated Cooler	25 °C-24hr running
	Issuing Office	Wall Type Cooler	
	Warehouse Manager Office	Ditto	
	Dispatching Office	Ditto	
	Receiving Office	Ditto	
2	Computer Room	Ceiling Type Cooler	
	Administration Office	Ditto	
	Conference Room	Ditto	
	IRA Branch Office	Wall Type Cooler	
	BED Branch Office	Ditto	
	Procurement Office	Ditto	
	Chief Pharmacist Office	Ditto	
	Assistant CP Office	Ditto	

2) Ventilation Facilities Plan

The Stores will be basically equipped with ventilation system for containing medical goods. The space or rooms not equipped with air-conditioner will be dealt with ceiling fans (600 ~ 900 mm in diameter).

a. Ventilation System

The ventilation system of each rooms will be shown as follows:

Table 2-28 Table of Ventilation

Floor	Room	Ventilation (Times/Hour)	Ventilation System	Remarks
1	Power Room	*	Mechanical Air-Supplying Mechanical Air-Exhausting	Generated Heat
	Generator Room	5	Natural Air-Supplying Mechanical Air-Exhausting	Combustion Quantity
	Machine Room	10	Mechanical Air-Supplying Mechanical Air-Exhausting	
	Issuing Store 1	3	Mechanical Air-Supplying Mechanical Air-Exhausting	
	Dangerous Drug Store	5	Natural Air-Supplying Mechanical Air-Exhausting	
	Emergency Store	5	Natural Air-Supplying Mechanical Air-Exhausting	
	Issuing Store 3	5	Natural Air-Supplying Mechanical Air-Exhausting	
	Miscellaneous Store	5	Natural Air-Supplying Mechanical Air-Exhausting	
	Bulk Store 1	3	Natural Air-Supplying Mechanical Air-Exhausting	
	Refrigerator Space	5	Natural Air-Supplying Mechanical Air-Exhausting	
	Flammable Store	5	Mechanical Air-Supplying Mechanical Air-Exhausting	
	Toilets	15	Natural Air-Supplying Mechanical Air-Exhausting	
	Security Room		Ceiling Fan	
	Janitor's Room		Ceiling Fan	
	Packing Area		Ceiling Fan	
	Dispatching Area		Ceiling Fan	
	Receiving Area		Ceiling Fan	
	Rest Corner 1		Ceiling Fan	
	Sink Room	15	Natural Air-Supplying Mechanical Air-Exhausting	
2	Women's Locker Room	10	Natural Air-Supplying Mechanical Air-Exhausting	
	Men's Locker Room	10	Natural Air-Supplying Mechanical Air-Exhausting	
	Sink Room	15	Natural Air-Supplying Mechanical Air-Exhausting	
	Conference Room	3	Natural Air-Supplying Mechanical Air-Exhausting	
	Rest Corner 2		Ceiling Fan	
	Toilets	15	Natural Air-Supplying Mechanical Air-Exhausting	
	Storage	5	Natural Air-Supplying Mechanical Air-Exhausting	

3) Cooling Plan

The Cold Stores will be equipped with cooling system for containing the drugs. The cooling conditions are as follows:

Cold Store 1 & 2

Type : Pre-Fabricated

Cooling System : Air-Source type

Store Temperature : 0 ~ 8

(5) Water Supply, Drainage and Sanitary Facilities Plan

1) Water Supply Facilities Plan

The main pipe of 200 mm in diameter is buried under the front road. The water pressure is reportedly 15-50 m/head (approx. 1.5-5 kgf/cm²), but possibly declined due to time and the amount of water supply is reduced, the water receiver tank will be adopted to keep the required water pressure.

a. Branch from the main pipe

The water pipe of 45-50 mm in diameter will be provided for the building from the main pipe buried in the front road, and the water will be supplied through a water meter. The water pipe from the main pipe to the water meter will be borne by MOH, and the other piping will be included in the construction.

b. Water Supply System

Due to the fluctuation of water pressure, the pressure pump will be adopted in order to keep the stable pressure and the amount of water.

• Assumed Water Volume

80 personnel (maximum number) x 100 (Litter / person • day) = 8,000L/day (1 day volume)

8,000(L/D) ÷ 8(H/D) = 1,000 L/H (Assumed Average Amount of Supply Water per Hour)

1.0 (m³) x 2 = 2.0 m³/H (Assumed Maximum Amount of Supply Water per Hour)

2.0 (m³/H) x 2 = 4.0 m³ (Effective Volume of Water Receiver Tank)

2) Drainage Facilities Plan

Although the Sewage Disposal Plant is completed in the city, the sewage piping plan is not yet existing for this site. The septic tank generally used in this area will be provided and will be possibly connected to the main sewage pipe at the point when buried at the site. The sewage water and the waste water are divided in the building, and will flow together in the outdoor water drain box through the septic tank, and the drain water will percolate into the earth.

3) Fire Extinguishing Equipment Plan

Fire Extinguishing Equipment will be provided conforming to the Japanese Fire Code, since the Standard for Fire Equipment is not established in the Suva City. The proposed Fire Distinguishing Equipment is as follows:

Indoor Fire Hydrant

However, the portable fire extinguisher will be provided by Fiji Government.

4) Outdoor Water Valve

The Outdoor Water Valve will be provided at the necessary points in order to maintain the building clean. The required points are: truck dock (2 valves), trash box, around septic tank, front yard.

(6) Electrical Equipment Plan

1) Main Power Equipment

a. Power Receiving

The electricity will be distributed to the low voltage distribution panel for users from FEA, through low voltage distribution panel provided by FEA in the rented transformer room in the site, at high voltage line (3 way x 4 wire, 11KV x 50 Hz) buried under the front road. The distributed voltage is 3 way x 4 wire, 415V/240V, 50 Hz.

b. Power Distribution Facilities

Low voltage distribution panel for users will be placed in the electricity room of the building. Assumed receiving power volume will be 250 KVA. Since the voltage fluctuation is anticipated not wide around 6 %, and is not influential to equipments, the automatic transformer will not be provided.

c. Emergency Generator

The driving time of in-house generator will be designed as for 3 hours, considering approx. 30 minutes black light due to 20-30 times lightning per annum.

The generator specification is as follows:

Predicted voltage : 100 KVA

Type : Diesel (fuel : crude petroleum)

System : Radiator System

Main Load : Fire Distinguishing Pump, Cold Store, Emergency Light, 24-Hour Air Handling Machine, Disaster Equipment.

2) General Electricity

a. Power Distribution Facilities Plan

The Power Board & the Distribution Board will be located by dividing the circuit so as not to be operationally problem, and the electricity will be distributed to each required load. The alarm from the power equipment will be displayed on the monitor of the Warehouse Manager room on the first floor. The contents of the alarm will be designed as follows:

When Emergency Generator, Fire Distinguishing Pump, Water Pump, Cold Store, 24 Hour A/C Handling Units are in bad order.

b. Lighting Fixture & Receptacles

The Lighting Fixtures will be provided at necessary locations. The receptacles will be provided in every room. The lighting fixtures of main rooms will be fluorescent lights, and the average intensity of illumination will be designed as follows:

Stores	80 Lux
Offices	300 Lux
Receiving / Dispatching / Sorting Area	100 Lux
Toilets & Corridor	80 Lux

The lighting block in the building will be subdivided into small groups so as to save energy. The emergency lights will be provided above passages in the Stores and the corridor among offices on the second floor, and the exit light will be provided above major exits. The switches of outdoor lighting will be automatically turned on and off with automatic timers, and the specification of lighting fixtures will be anticorrosive against sea breeze.

3) Telephone & Communication Facilities Plan

The cables will be withdrawn with underground cables. The designed number of circuits will be around 6 outside lines and 16 extension lines. The conduit for the prepaid card public phone (by Fiji Government) will be provided in the rest corner on the second floor. The telephone line will be distributed and connected through desk-type switchboard. In addition, the withdrawal of the telephone line from outside of the site will be done by Fiji Government, and the electrical work from the main terminal board will be involved in the scope of construction by Japanese Grant.

4) Public Address System Equipment Plan

The amplifier will be provided in the Warehouse Manager Office for paging, announcements and time chimes to the stores and the whole building. The amplifier will be wall-suspended type.

5) Interphone Equipment Plan

The interphones will be provided for the security reason in the rooms below :

The main phone will be installed in the Warehouse Manager Office on the first floor, and the small phone will be installed in the administration office on the second floor and in the Security Box near entrance gate.

6) Television Community Antenna Equipment Plan

The conference room on the second floor will be connected with the conduit pipes, that can

introduce antenna cable from TV antenna establishment place due to television receptacles of UHF and VHF. The work involved in the contract is only conduits pipes.

7) Automatic Fire Alarm System Equipment Plan

The automatic fire alarm system will be provided in this building, and will be connected to the fire station through telephone line. The receiver will be installed in the Warehouse Manager Office. The sensors will be selected in consideration of the purpose, ceiling height and interior environment of each rooms. The sensor installed in the Rest Corner on the second floor will be spot type, since it will be used as the cafeteria.

8) Lightning Equipment Plan

The lightning equipment will be installed since this area is frequently struck by thunder. The lightning belt will be installed along the edge of the roof, and the lightning will be discharged effectively utilizing the building structure.

(7) Waste Disposal Plan

The wastes disposed from this center will be divided into small amount of office wastes and medical wastes such as corrugated cardboard, paper box and bottles. Since the City Packer vehicles will collect the wastes, the trash box will be provided inside the site. The trash box is divided in three rooms for flammables, non-inflammables, bottles and cans, and the water valve will be attached.

(8) Basic Design Drawing

1) Project Facility Layout Plan

2) Project Floor Plans (First Floor and Second Floor)

3) Project Elevation and Sectional Plan