USAID FIRMS PROJECT

Business Plan for Dates Commercial Cold Storage Facility, District Khairpur

June 2010

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Abstract

The purpose of this work plan is to propose the setup of a cold storage facility for dates in District Khairpur. Such interventions will improve the storage of this horticulture crop and ensure a longer shelf life.

Acronyms

FAO	Food and Agriculture Organization
F & V	Fruit and Vegetable
Mandi	Wholesale Market Place
MT	Metric Ton
PHC	Pre Harvest Contractor
RMA	Rapid Market Appraisal
RRMA	Rural Rapid Market Appraisal
SOW	Scope of Work

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Executive Summary

Across the world, date fruit is consumed in its fresh form which is also known as 'table dates'. In the Muslim countries, fresh Dates are commonly used to break the fast during the holy month of Ramadan. Fresh Dates are considered a nourishing fruit as it contains multiple types of sugars, carbohydrates, vitamins and minerals. In Pakistan, dates are the third-largest horticulture crop, with annual production of 550,000 to 650,000 MT making the country world's fifth-largest producer of Dates. USAID Firms Project is currently working in the Pakistani Dates sector with a strategy developed to support both the components of the value chain i.e. Date Palm Farm SMEs and the dates processing SMEs. The program is aimed to address the farm management, processing and storing practices. The program elements include skill development; infrastructure up gradation and, marketing support to the 48 dates sector SMEs in order to enhance the quality of dates and help the selected SMEs in fetching better prices in local as well as international markets.

Apart from the key constraints that the project is trying to address through the above mentioned interventions, this sector still struggles to increase its share in terms of value compared to other Dates producing countries due to many constraints. One of the key constraints is unavailability of modern and commercial cold storage facility in Khairpur or Sukkur district. Moreover, for the next 30 years, the month of Holy Ramadan will be coming before dates harvesting season (i.e. July) and this means only those farmers will survive and fetch good prices (and profits) who have access to a nearby modern cold storage facility. This facility will improve the storage conditions for fresh Dates subsequently improving the economic benefits which the dates sector stakeholders will be able to draw due to the removal of the compulsion to liquidate the harvest at the earliest to pay off their debts from the traders.

The proposed cold store will be a state-of-the-art facility with modern refrigeration and tracking system which the existing cold stores at Khairpur and Sukkur lack. The benefits of the proposed cold store do not only cover the Dates sector but this facility can also be used to store other fruits and vegetables of the area to enhance the viability of its commercial operations. The proposed cold store will also result in reduction of logistical costs for transporting Dates to cold stores at different destinations, , enhanced quality, enabling farmers to produce more fresh Dates instead of dry Dates (which are exported to India on low margins and according to a sector expert India is striving to develop its own dates sector for production of dry Dates locally thereby leaving no space for Pakistani dry Dates in Indian markets in the next 10 years or less), empowerment to farmers in bargaining the prices with local buyers (traders, processors, exporters) by holding their inventories. The facility will generate 25 direct jobs at and revenue of USD 3,008,220 within five years.

The work on the business plan for the commercial cold storage facility was undertaken on the request of USAID. USAID officials identified the opportunity during their field visit to Khairpur district. As this intervention is not part of the AIP submitted by USAID Firms Project, the undertaking will require allocation of additional funding by USAID.

1. Introduction

1.1 Project Brief

Fresh Dates require proper post harvest handling, appropriate temperature and relative humidity for longer storage periods. Currently, no such facilities are available in and around districts of Khairpur and Sukkur to store the large quantities of fresh Dates. In the proposed "Compartmentalized Commercial Cold Storage" project, storage will be done according to the modern technology and on scientific lines. The project will ensure availability of better quality of fresh Dates and other perishable fruits and vegetables in Khairpur and Sukkur districts to cater to both exports and domestic sales.

The proposed cold storage facility has a maximum storage capacity of 2,000MT, having state of the art racking system for sustainable operations under strict food safety standards.

The cold storage is proposed to be located at Theiri, Khairpur district on main highway to create more opportunities for trading business across the province. The proposed location will have access to all infrastructure facilities including roads, water, electricity and, telecommunications. The proposed project of cold storage needs a capital investment of about Rs.200 to 220 million (PKR), which includes acquisition of land, civil works, plant and machinery, equipments and all the required infrastructure facilities.

1.2 Project Background

All fruits and vegetables require proper post harvest handling, appropriate storage conditions, which most of the existing cold storage facilities in Pakistan lack. The cold storage facility in Khairpur district is one of the major infrastructure requirements for the Dates sector.

The project will ensure the increased availability and improved quality of high value fresh Dates for both export and local sales, which would otherwise perish or deteriorate in terms of quality and will fetch lower prices and lower margins. Pakistan's major chunk of Dates export find its way into lower end markets for industrial use and is primarily used in liquor extraction. The proposed cold storage facility will work as a facilitation point in a way that it will store multiple horticulture products beyond the Dates season to make it a commercially viable venture. The major clientele for this business will be the farmers and processors of Dates.

Currently, there is no support initiative from any governmental and/or donor agency for the establishment of cold storage facilities in Khairpur district for the Dates and/or any other horticulture sector. Keeping in view the seasonal cycle of Dates, there are some significant impediments/constraints highlighted to elaborate the problems of the Dates sector in Khairpur.

1.3 Physical and Physiological Disorders of Dates Due To Improper Storage

1.3.1 Darkening

Both enzymatic and non-enzymatic browning occurs in Dates and increase with higher moisture content and higher temperatures. Enzymatic browning can be inhibited at low oxygen concentrations and low temperatures caused by unavailability of cold stores in area.

1.3.2 Skin Separation (Puffiness)

Skin is dry, hard and brittle, and is separated from the flesh. This disorder usually develops during early 4-5 months of storage in normal temperature and improper inventory management. Commercial Cold Storage Facility – Business Plan Page 7

1.3.3 Sugar Crystallization (Sugaring)

This disorder results from crystallization of sugars below the skin and in the flesh of fresh Dates. Although it does not influence taste but it alters/damage the fruit texture and appearance. The severity of sugar spotting increases with storage temperature and time which is one of the major current issues prevails in Khairpur district. The identified problem will be reduced, if farmers able to do proper storage of fresh Dates at recommended temperatures.

1.4 Project Rationale

By keeping in view the seasonal cycle of Dates and other socio economic factors, few major constraints need to be elaborate which are the root causes for problems of the industry:

The farmers are under contractual agreement with date traders due to their reliance on informal financing by the Dates traders.

- The traders are more focused on dry Dates and they traditionally require these farmers to produce dry Dates in large quantities by convincing these farmers that their fresh date will be wasted and it requires more processing as compared to dry Dates.
- The farmers are duly forced by traders and nature (as the harvest season falls during monsoon), which pushes the farmers towards heavy production of dry Dates to sell their stocks.
- The farmers do not have a storage facility (cold store) where they can store their fresh produce for relatively longer period to enable them to fetch relatively good prices as compared to peak season selling.
- Processors are under pressure due to non-availability of cold storage in Khairpur district, as they have to send their stock of Dates to other cities for cold storage e.g. Peshawar, Sukkur, Quetta, Lahore and Rawalpindi etc.
- The transportation and rental cost of the cold storage in other cities increases the cost of business of these processors.
- The transaction time also gets prolonged due to the transit time involved in back and forth cold storage facilities in other cities.
- The whole transportation mechanism, handling etc. severely damages the quality, shape and compromises food safety of the Dates stock due to poor storage, transportation mediums and high fluctuations in temperature during the entire cycle.
- In the light of this analysis, the demand for a modern cold storage facility located locally at Khairpur was calculated

2. SWOT Analysis

2.1 Strengths

- State-of-the-art facility (customized facility, state of the art machinery/equipment maintaining the required temperature(- 180 C), backup power generation and ultra-modern racking system for cold storage in Khairpur
- Superior quality of stored fruits in the facility by maintaining international food safety standards(e.g. Dates, Apples, Citrus etc)
- Inventory and Operation Management Systems
- Fully secured facility
- Access to locally available modernized storage facility to date palm farmers as compared to storage facilities in other cities e.g. Lahore, Peshawar, Quetta and Karachi by saving transportation cost.
- Provision of future expansion in storage capacity against future demand.
- Storage hub(s) for all inter provincial transfer of horticulture produce (e.g. Punjab, Sindh, and Baluchistan).

2.2 Weaknesses

- Higher operational expenses during off season.
- Perceived higher rental prices as compared to other conventional cold stores in Khairpur and Sukkur

2.3 Opportunities

- Availability of spare storage space during off season, the operator can offer services for storage of commodities other than fruits e.g. fruit and vegetable pulp, butter, chocolate, medicines etc
- Possibility of long-term contracts with companies like [redacted] etc
- Presence of strong potential clientele in shape of Dates Processors/Exporters in Khairpur
- Provision of addition/integration of processing facility.
- Economic stability in sector(s) by creating new jobs.
- Attraction for new investors.

2.4 Threats

- Interrupted supply of electricity in Khairpur hence increasing the operational cost
- Law and order situation at Khairpur
- Fluctuating prices of electricity and diesel may affect the operational cost.
- Unavailability of skilled labor for modern machinery operations

3. Demand Analysis

Table 1 Demand Analysis for Cold Storage Facility for Date Palms SMEs in Khairpur

S. No	Description	No. of SMEs	Minimum Storage Quantity (MT)	Transportation Charges (PKR)		Rental per ton (PKR)
				Two side	One side	
1	Dates Processors	8	10,000	6,000	3,000	1,500
2	SME Date Palm Beneficiaries	45*	225**	6,000	3,000	1,500
3	SME Date Palm Farmers	1,000#	5,000##	6,000	3,000	1,500

Table 2 Industry Cold Storage Demand - Processors Side

S.no	Estimated Demand (08 Processors)	Quantity	Rate	Total
01	Sector Estimated fresh Dates production (20% of 650,000 MT)	130,000 tons		
02	Minimum storage requirement (all 08 processors) in season	10,000 tons		
03	Freight cost (to and fro)	10,000 tons	Rs 3,000/ton*2	Rs60,000,000
04	One Month rental of 10,000 tons	10,000 tons	Rs.1,500/ton/month	Rs.15,000,000
05	Eight Months rental of 10,000 tons	10,000 tons	Rs.1,500 x 10,000 x 08	Rs.120,000,000

Table 3 Industry Cold Storage Demand – 45 Date Palm Farm SMEs

01	Sector Estimated fresh Dates production (20% of 650,000 MT)	130,000 tons		
02	Minimum storage quantity (45 SME beneficiaries farmers* @ 5 tons per farmer**) in season	225 tons		
03	Freight cost (one side)	225 Tons	Rs. 3,000/ton	Rs. 675,000

04	One Month rental of 225 tons	225 Tons	1,500/ton/month	Rs.337,500
05	Eight Months rental of 225 tons	225 Tons	1,500 x 225 x 08	Rs.2,700,000

*USAID Firms Project- 45 SME Date Palm Farm Beneficiaries

**Average Production of Fresh Dates per farmer at Khairpur in 2012 season

Table 4 Industry Cold Storage Demand – Date Palm Farm SMEs

S. no	Estimated Demand (SME Farmers) Quantity		Price Total	
01	Estimated fresh Dates production (20% of 650,000 MT)	130,000 tons		
02	Minimum storage quantity (1000 SME farms @ 5 tons per SME farm) during season	5,000 tons		
03	Freight cost (one side)	5,000 Tons	Rs.3,000/ton	Rs. 15,000,000
04	One Month rental of 5,000 tons	5,000 Tons	1,500/ton/month	Rs.7,500,000
05	Eight Months rental of 5,000 tons	5,000 Tons	1,500 x 5000 x 08	Rs. 60,000,000

3.1 Findings from Sukkur

3.1.1 Fruits

- Apple, Citrus, Dates, strawberry, Grapes, Plum etc.

Storage Duration

- Apple: October to July
- Citrus: April to July
- Dates: Sep to April

Storage Capacities

There are around 10-12 medium and large cold storages in Sukkur having combined capacity to store approx. 500,000 wooden crates of apple (16-18 Kg each Crate). In general, the overall cold storage capacity in Sukkur Market is approx. 8000 MT for apple or 12000 MT for Dates. There is no modern storage facility is available across Sukkur and Khairpur districts.

Storage Rental Rates

- Apple: Rs. 30-35 / crate/ month
- Citrus: Rs. 35 / crate/ M\month
- Dates: Rs. 40-45 / 35kg crate/ month
- The product turnover for apple and Kinnow is generally greater than Dates.

Table 5 Fruits

Fruits	Packaging	Fruit receiving time at cold store	Duration of product storage	Total no. Of cold storage in Sukkur	Approx. Storage capacity	Rent/ crate/ month (PKR)	Fruits turnover
Apple	16-18 Kg Crates	Aug to Oct	Oct to April	10 to 12	500,000 Crates of Apple (8,000 MT)	30-35	Moderate
Citrus	10-12 Kg Crate	March to April	April to July			35	High
Dates	35-38 Kg Crate	Sep to Oct	Oct to July			40-45	Low

Table 6 Cyclic Trend Analysis of Storage of Different Fruits in Cold Stores at Sukkur

Months/ Fruits	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Dates	0%	0%	10%	50%	70%	60%	50%	50%	40%	30%	10%	5%
Apple	0%	10%	15%	25%	25%	25%	25%	20%	15%	10%	5%	5%
Citrus	0%	0%	0%	0%	0%	0%	0%	0%	5%	20%	15%	5%
Other Fruits	10%	5%	5%	5%	5%	10%	5%	5%	5%	5%	5%	5%
Total capacity utilization out of 100%	10%	15%	30%	80%	100 %	95%	80%	75%	65%	65%	35%	20%

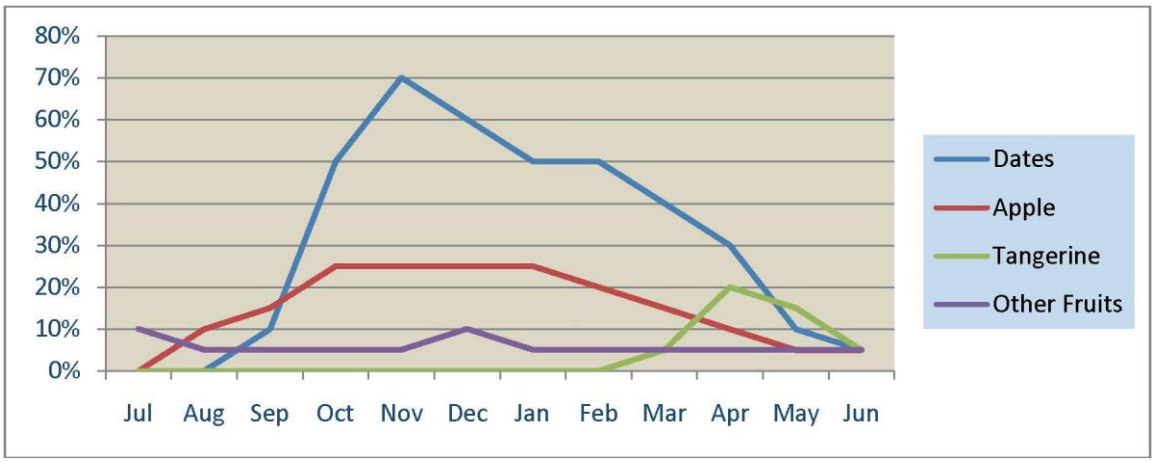


Figure 1 Cyclic Trends over time

Table 7 Test Case - Holding Power and Utilization of Cold Storage Facility of a SME Date Palm Farmer

	Q1			Q2			Q3			Q4		
Farmer Cold Store Utilization	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
Holding power (in tons)	0	0	40	40	35	30	25	20	15	10	10	0
Market Value (PKR)	0	0	2,857,143	2,857,143	2,500,000	2,142,857	1,785,714	1,428,571	1,071,429	714,286	714,286	0
Incremental Cost (Rental per month)	0	0	120,000	120,000	105,000	90,000	75,000	60,000	45,000	30,000	30,000	0
Incremental Revenue (Value Addition)	0	0	2,857,143	3,428,571	3,500,000	3,428,571	3,214,286	2,857,143	2,357,143	1,714,286	1,857,143	0
Incremental Margin	0	0	(120,000)	451,429	895,000	1,195,714	1,353,571	1,368,571	1,240,714	970,000	1,112,857	0
Incremental sales	0	0	0	571428.6	1000000	1285714.29	1428571	1428571	1285714	1000000	1142857	0
Percentage increment in Revenue	0%	0%	0%	20%	40%	60%	80%	100%	120%	140%	160%	0%

Assumptions:	
Production of a SME Date Palm Farmer (20 acres)	80 tons
Production of Fresh Dates (50%)	40 tons
Market Value per crate (35 kg)	PKR 2,500

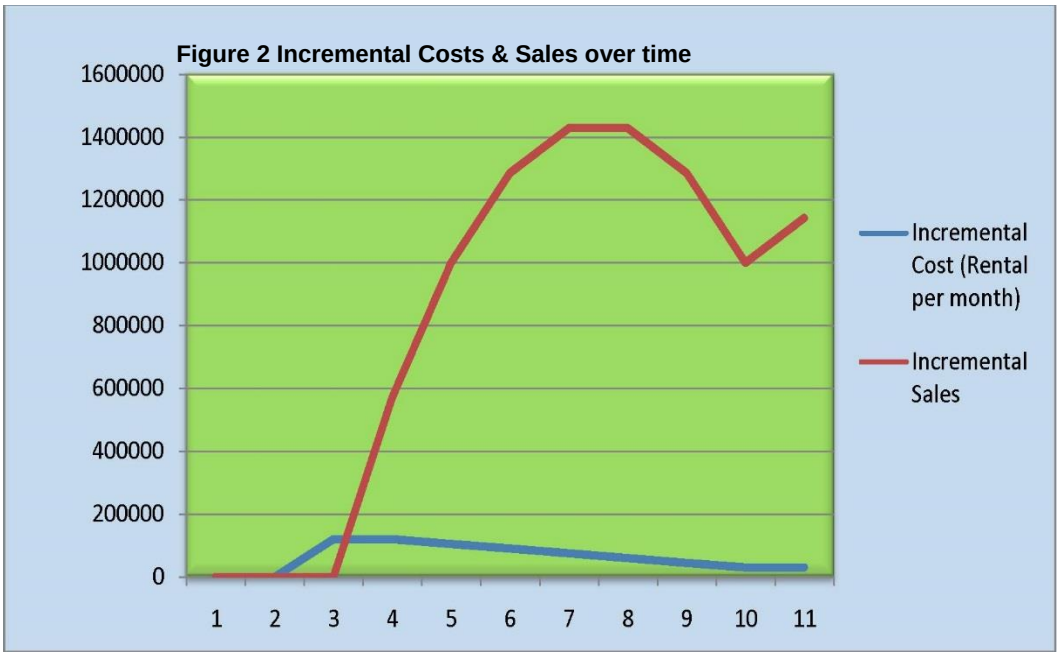


Figure 2 Incremental Costs & Sales over time

4. Proposed Commercial Cold Storage Facility

The proposed Cold Storage facility has a maximum storage capacity of 2,000 tons. The cold storage is proposed to be located at District Khairpur, giving easy access to the processors and especially farmers to store their produce for a longer period. Its need is felt more now because of the Ramadan factor as in the following more than 25 years, Ramadan will fall before Dates harvesting season which means that farmers will fetch better prices (and profits) who have access to a nearby cold storage facility.

The proposed project of Cold Storage will require a capital investment of about Rs.207 million (US$ 2.07 million approx) inclusive of civil work and installation of cold store fixtures and machinery.

4.1 Benefits of Commercial Cold Store Facility at Khairpur

- Development of state of the art cold storage facility at Khairpur.
- Reduction in freight costs for Dates sector SMEs.
- Reduction in Transaction time
- Enhanced quality of fresh Dates due to less transportation and handling which cause contamination and wastage.
- Enabling farmers to produce more fresh Dates instead of dry Dates
- Initiate empowerment to farmers in bargaining with local buyers (traders, processors, exporters) to fetch better prices by holding their inventories.
- District level direct and indirect employment generation
- Storage hub for other fruits & vegetables transported from other parts of Pakistan e.g. Apple, Grapes, Citrus, Carrots, Potatoes etc round the year.
- Cater other major crops locally cultivated in Sukkur & Khairpur districts e.g. banana, Strawberries, Carrots etc
- Opportunity for Incremental revenue generation by providing cold storage contractual services to [redacted]) Ltd by storing their products e.g. butter, yogurt etc.

4.2 Market Opportunity

Presently, there is no significant cold storage facility in the area. Even in the conventional cold stores at Sukkur and elsewhere, the fresh Dates are not stored at their recommended temperature and relative humidity levels, and this affects the quality of the stored Dates badly. Fresh Dates require appropriate temperature and relative humidity control in the store for maintaining the proper quality of stored Dates for a longer period of time... As there are no commercially operated compartmentalized cold storage facilities available in district Khairpur and Sukkur, entrepreneurs and investors have an attractive earning potential because of marginal/negligible competition from these conventional cold stores.

4.3 Proposed Capacity

The proposed Cold Storage facility has a maximum storage capacity of 2,000 metric tons of fresh Dates and other fruits (e.g. Apple, Citrus etc).

4.4 Project Cost

The proposed project of Cold Storage will require a capital investment of about Rs.207 million (US$ 2.07 million approx), inclusive of land, machinery, equipment as well as infrastructure development. The project will be initiated under cost share arrangement between USAID Firms Project and a private sector stakeholder SME. The proposed cost-share is given below:

Table 8 Project Cost Share

Commercial Cold Storage Initiative
Capacity - 2000MT
Area - 1.85 Acres Approx
Total Estimated cost - 2.32 million US$
Estimated Cost Share Mechanism

Dates Sector Initiative
Location: Khairpur District
Timeline: 12-14 Months

Firms project Cost Share				Beneficiary's Cost Share			
Sno	Activity Description	Estimated cost (PKR)	(US$) @ 95	Sno	Activity Description	Estimated Cost (PKR)	(US$) @ 95
1	Hiring of environmental consultant	1,000,000	10,526	1	Land Acquisition (80,000 sq.ft)	6,000,000	63,158
2	hiring of civil engineers for over sight of construction activity	1,500,000	15,789	2	Legal documentation e.g. lease, tax etc	1,000,000	10,526
3	Hiring of Cold storage machinery experts over sight of cold storage machinery installation activity	1,500,000	15,789	3	Architectural designs/layout/BOQ's etc	2,000,000	21,053
4	Hiring of electrical engineers over sight of electric works activity	500,000	5,263	4	Civil work/construction	48,028,960	505,568
5	Cold storage insulation material	29,622,000	311,811		complete sewerage works	2,000,000	21,053
6	Refrigeration machinery and installation	37,521,565	394,964	6	Complete electrification of proposed facility	2,000,000	21,053
7	Modern racking system for cold store (food grade stainless steel), steel pallets	44,646,510	469,963	7	Electric Transformers / electricity connection/gas connection/water connection etc	2,500,000	26,316
8	fork lifters (02)	2,000,000	21,053	8	purchase of furniture/fixtures	1,500,000	15,789
9	Hydraulic hand trucks (02)	140,000	1,474	9	Office supplies	50,000	526
10			-	10	Security arrangements/guards/security check posts	1,500,000	15,789
11			-	11	Initial Capital for operations (03 months)	5,000,000	52,632
12			-	12	Cash	14,201,489	149,489
13			-	13	Store & Machinery -Supplies	1,500,000	15,789
14			-	14	Acc Recievables	3,120,000	32,842
15			-	15	Back up Generator (635 KVA)	12,258,200	129,034
16		118,430,075	1,246,632	16		102,658,649	1,080,617

Sno	Description	Estimated Cost (PKR)_	Estimated cost US$	%
	Estimated Firms Project cost share	118,430,075	1,246,632	53.5668
	Estimated Beneficiary's cost share	102,658,649	1,080,617	46.4332
	Total Project Cost	221,088,724	2,327,250	

P.S: All the costs are based on estimation provided by consultant. Variance of 10-15 percent may occur at the time of activity implementation.
All given cost estimates are exclusive of M&E, PA and other internal operational procedures required to fulfill the activity

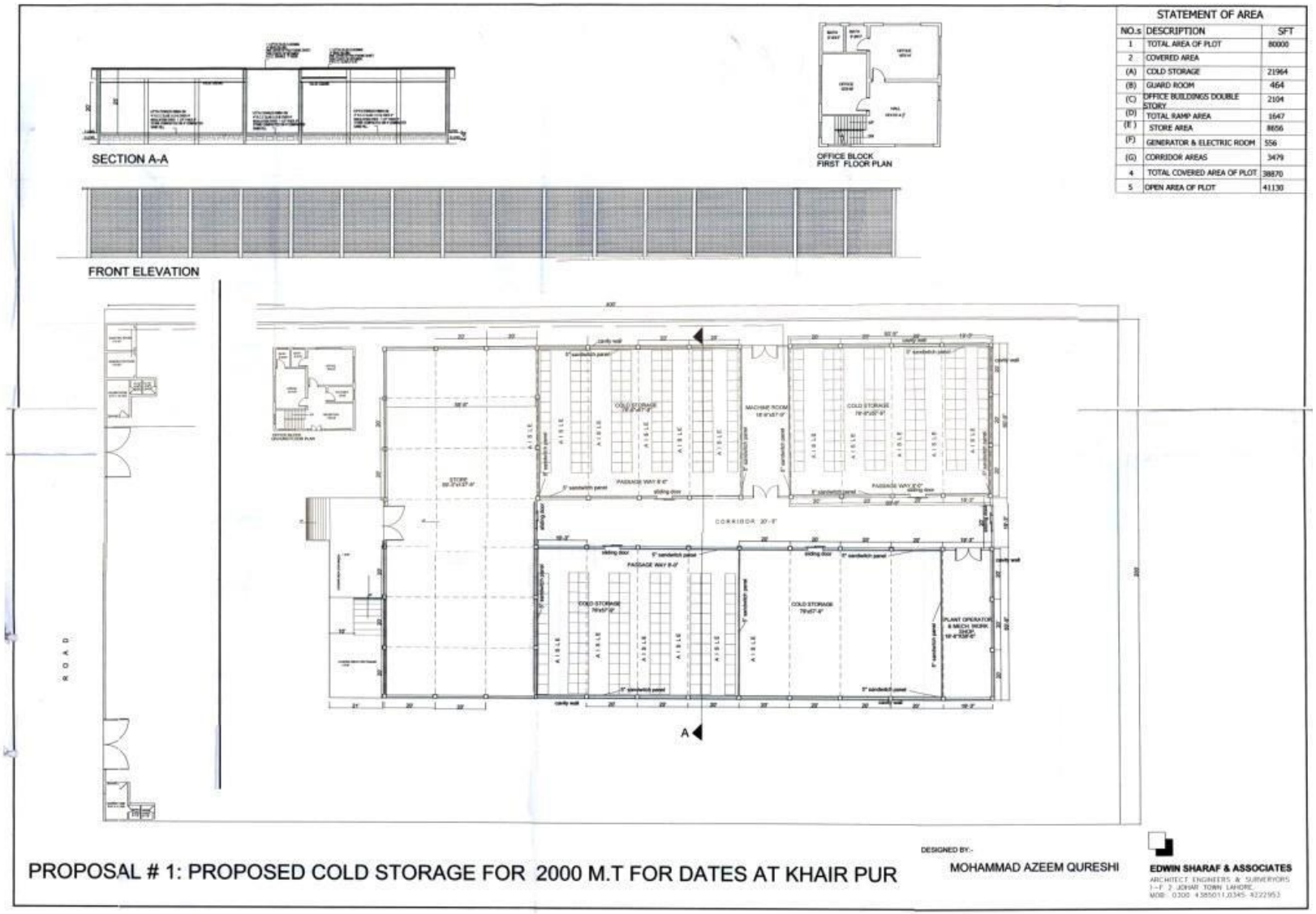


Figure 3 Layout Plan for Cold Storage Facility

4.4.1 Civil Works Overview

The project consists of structural design and construction of 2,000 MT capacity cold store building in RCC frame structure with double tee roofing system. Other associated buildings consist of a double storey office block, single storey guard room, generator room, 8'-9" high boundary wall, ramps, platforms and concrete paver in the open area.

The cold storage building will consist of Pre-fabricated refrigerated (Walk-in type) structure. This type of structure is highly superior to any form of refrigerated storage construction previously available in Pakistan due to its better technology and energy efficiency. Polyurethane insulated panels will be used to erect the building because these panels are metal clad and can be easily dismantled for relocating the cold storage site. The cold storage building will have a roof of insulated corrugated sheet of galvanized mild steel to protect it from direct sun and rain. The floor will have a surface of polyurethane insulated galvanized steel material. The floor will be strong enough to withstand the distributed load. An automatic monitoring system will be installed in the storage compartments for maintaining relative humidity and temperature and to eliminate any chances of human error during the refrigeration period. The cold storage will have four (04) storage chambers/compartments, in which three (03) chambers will have modern racking system and the fourth one will be utilized for conventional storage of sacks, without modern racking system.

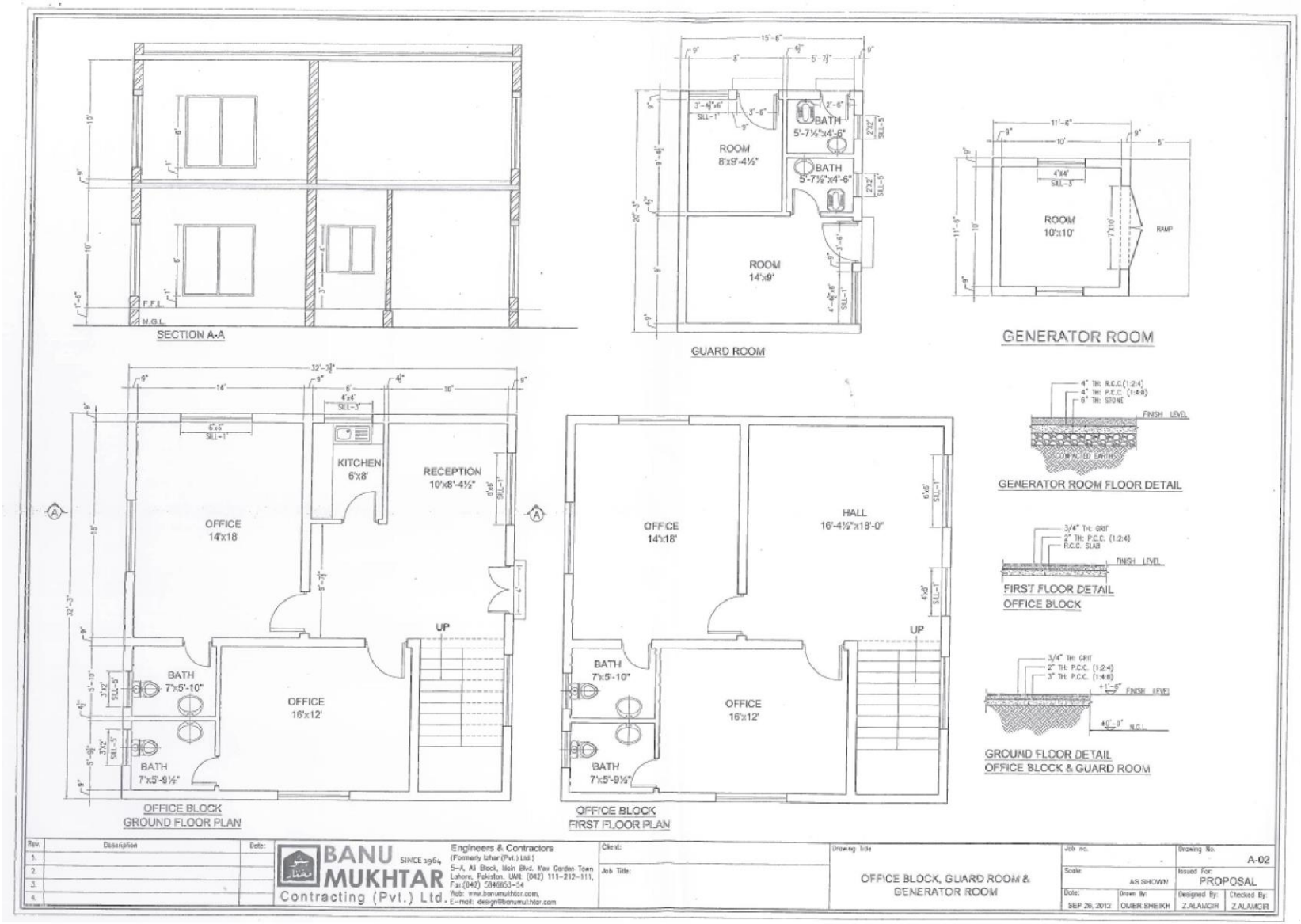


Figure 4 Civil Work Structural Drawing

4.5 Civil Works Specifications

Approximate Covered Area and cost break-up for 2000 MT capacity cold store is given as follows:

Table 9 Cost Breakup

Building Description	Area	Unit	Unit Rate (PKR)	Amount (PKR)
Main Store	35,148	Sqft.	1160	40,771,680
Office: Ground Floor	1,052	Sqft.	1455	1,530,660
Office: First Floor	1,052	Sqft.	1135	1,194,020
Guard Room	628	Sqft.	1820	1,142,960
Generator Room	132	Sqft.	1920	253,440
Ramps and Platforms	2,010	Sqft.	570	1,145,700
Paved Area	41,030	Sqft.	135	5,539,050
Boundary Wall	1,079	Sqft.	1240	1,337,960
Main and Wicket Gate	L.S.	-	-	200,000
Septic Tank and Soakage Pit	L.S.	-	-	250,000
Total				**53,365,470**

4.6 Human Resource Requirements

The Cold Storage facility requires the following Human Resources/Staff:

Table 10 HR Staff Employed

Job Title	No. of Resources	Monthly Salary	Salary/annum
Cold Store Manager	01	50,000	600,000
Cold Store Supervisor	01	30,000	360,000
Cold Store Operator /Technician	02	20,000	480,000
Fork Lift Operator	01	15,000	180,000
Office Accountant	01	20,000	240,000
Office Boy	02	12,000	288,000
Cold Store Helper	03	8,000	360,000
Security Guard	04	10,000	480,000

4.7 Cold Store Plant & Machinery Specifications

A total of four (04) room specifications for the construction along with Dimensions and features are as follows:

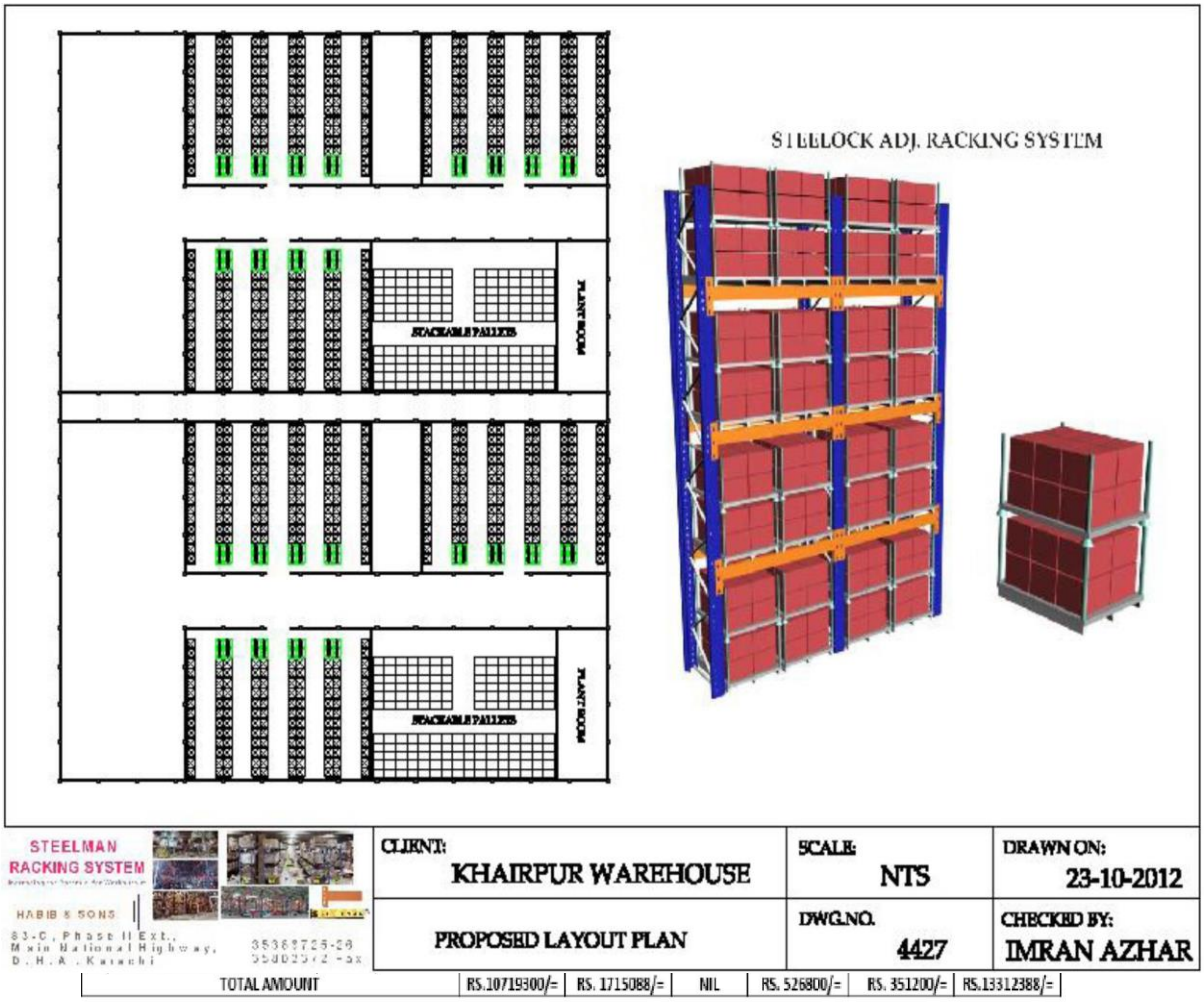
Table 11 Room Specifications

ROOM AND UNITS SPECIFICATIONS

Place		PAKISTAN	
Name of the room		Central System, Deep Freeze Storage Rooms	
Room no		1, 2	3, 4
Room width	(m)	18,29	18,29
Room length	(m)	24,38	24,38
Room height	(m)	7,62	7,62
Room volume	(m^3)	3.398	3.398
Indoor temperature	(°C)	-18	-18
Evap. Model		**IC 50,48**	**IC 50,48**
indoor unit cooling capacity (SC3)	(Watt)	28.325	28.325
indoor unit cooling capacity (SC4)	(Watt)	22.500	22.500
indoor unit - surface area	(m^2)	146,60	146,60
indoor unit - fan speed	(rpm)	1.400	1.400
indoor unit - Defrost Resistance	(kW)	24,5	24,5
indoor unit - Air flow	(m^3 / h)	27.325	27.325
indoor unit - Sound Level	(5 m. - dBA)	52	52
Evap. unit fan diameter	(mm/qtty)	500 x 4	500 x 4
Evap. Quantity in every room		4	4
Total indoor unit		8	8
indoor & outdoor unit fan brand		ZIEHL ABEGG	
Electrical Circuit Elements		SCHNEIDER	
Refrigeration Circuit Elements		DANFOSS	
Compressor		**FRASCOLD**	
Compressor Type		S.herm. screw	
Compressor Model		R-TSL1-60-210	
Compressor Power		60 hp x 5 pcs.	
Compressor - COP		1,15	
Model of the units		**SSL 3005 - CF**	
Evaporating / Condensing temp.	(°C)	-25 / +50	
Cooling capacity	(kW / h)	357,6	
Total Units Quantity	(Qtty)	1	
Total Cooling capacity	**(kW / h)**	**357,6**	
Total number of rooms		**2**	**2**

Table 12 Equipment Description

Cold Store Plant & Equipment Description	Model	Quantity
Central System Refrigeration Group	SSL 3005 – CF	01 Pieces.
D.F Storage Equipment Indoor Unit	IC 50,48 Evap.	16 Pieces.
Digital Control Panel	DIXELL	04 Pieces.
Remote Control System	DIXELL	01 Pieces.
Mounting and Mounting Equipments		16 Pieces.



ROOM "D" (without racks)

S#	DESCRIPTIONS	QTY	UNITR PRICE	TOTAL AMOUNT	16% G.S.T	OTHER TAXES IF ANY	FRIEGHT	INST.	NET TOTAL AMOUNT
1.	STEEL STACKABLE PALLET SIZE: 1050 X 1050 mm	1050 NOS	RS.7500/-	RS. 7875000/-	RS. 1260000/-	NIL	RS. 315000/-	RS. 210000/-	RS. 9660000/-

4.8 Generator Specifications

The proposed backup generator for the commercial cold storage facility will be according to giving below specifications.

"Diesel Gen set model C-18 of 508 KW / 635 KVA, (With Fan), Prime Power, at ISO condition, 1500 RPM, 50 HZ, 400V, 0.8 P.F."

Table 14 Prime Power

S.no	Description	Specification
01	Average Power Output	70% of prime power rating
02	Load	Varying
03	Typical Hours/Year	Unlimited
04	Typical Peak Demand	100% of prime rated eKW with 10% overload capability for emergency use for a maximum of 1 hour in 12. Overload operation cannot exceed 25 hours per year.
05	Typical Application	Industrial, Pumping, Construction, Rental, and Co- Generation

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