# VALUATION OF COLD STORAGE PLANT

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**REGISTERED VALUER (TN)**

## 1.0. INTRODUCTION

Canning, Freezing, Drying and dehydration, Salting method, Smoking method, Addition of preservatives, anaerobic treatment, Sterilization and using of Liquid nitrogen are some of the food preservation methods

Yet another method is Refrigeration method. This is a process of lowering the temperature in a given space and maintaining it for the purpose of chilling foods. Storing perishable foods, furs, pharmaceuticals, or other items under refrigeration is commonly known as **cold storage**. Refrigeration checks both bacterial growth and adverse chemical reactions that occur in the normal atmosphere. Foodstuffs maintained at this temperature, have an increased storage life.

### 1.1. INDIAN AGRICULTURAL VIEW

India is the largest producer of milk, fruits, cashew nuts, cocoanuts, ginger, turmeric, black pepper, tea, wheat, groundnuts, vegetables, sugar, fish, tobacco, rice, egg and meat in the world. India accounts for 10 per cent of the world fruit production. As per Government of India's report - 2007, the present availability of cold storage capacity is approximately 103.5 lakh tonnes, Although 90% of these units are made to store only potato even then it does not meet the requirement of the single crop, the production of which is about 300 lakh tonnes. Another 120 lakhs tonnes will be the projection for the next 5 years for cold stores.

### 1.2. PROMOTIONAL SCHEME BY GOVERNMENT OF INDIA

Government of India, have accorded the highest priority for cold storage plants. Promotional schemes, for the public, co-operative private and joint sectors, for capital investment subsidy

scheme for construction/ modernization/ expansion of cold storages. Industrial status, exemption from land ceiling act, use of forest land on leasehold basis, identification of cultivable wastelands, industrial power feeder, 20% of the fixed assets as capital subsidy up to Rupees 50 lakhs, sales tax concessions, technological assistance, pollution clearance charges exemption up to rupees 10000/- per annum are some of the schemes for setting up a cold storage plant.

**1.3. COLD STORAGE DATA FOR SOME FRUITS AND VEGETABLES IN INDIA**

| Product | Storage Temperature °C | Life in Weeks | Storage Season |
|---|---|---|---|
| Potato | 2-4 | 32-36 | March to October & October to January |
| Cauliflower | 0-1.5 | 8-10 | February to April & August to October |
| Cabbage | 0-1.5 | 10-12 | February to May & August to October |
| Tomatoes | 7 | 4-5 | April to May & September to October |
| Lime | 8 | 6 | March to April & August to September |
| Ginger | 2-4 | 14 | February to April |
| Orange | 7-8 | 8 | February to April |
| Mosambi - Sweet Lime | 6-8 | 8 | April to July & Nov. to February |
| Apples | 0-15 | 16-20 | October to March |
| Eggs | 1-5 | 20-24 | May to December |
| Mango | 8-10 | 4-6 | May to June |
| Frozen Foods | -18 to -20 | 24 or more | Year round |

## 1.4. INDUSTRY STANDARDS

The Indian Ministry of Agriculture, specifically its Department of Food Processing Industries, sets key parameters for import compliance in conjunction with the Department of Health. All food product imports have to comply with industry standards and laws such as:

- Prevention of Food Adulteration Act
- Fruit products order
- Milk and milk products order
- Meat and meat products order
- Weights and Measures Act (for packaged food products

## 2.0. INDIAN COLD STORAGE PLANTS

These are generally designed for storing a variety of products. Commodities like various types of fresh fruits and vegetables, dry fruits, spices, pulses, milk products. In Uttra Pradesh, Bihar, Punjab, West Bengal and Madhya Pradesh for single commodity storage such as potatoes. Units in Maharashtra and Gujarat and the Southern states are of multipurpose type designed for storage of various commodities.

In Tamilnadu, region wise cold store design varies - In area like Tuticorin, Ramnad and coastal belts cold stores are for frozen sea food products, Erode for turmeric, butter, dairy products and pulses, Salem for mangoes, Dindugal and Madurai for vegetables and flowers, Ariyalur belt for chilies and spices, two units now under operation in Trichy for different commodities and many cold stores around Tamilnadu are used for storage of various commodities.

### 2.1. CHAMBER DESIGN

The occupancy levels in the multi commodity stores are better than those used for single commodity storage. However, the chambers in multi commodity stores have to be designed for maintaining different temperatures and sometimes relative humidity to suit different products. Construction practices vary largely, in different parts of the country depending on the type of usage. The bulk commodity stores have chambers of large sizes whereas the multi-purpose units have many chambers of smaller sizes to suit the customer needs. These medium temperature cold stores are generally constructed with 2 to 6 floors. The capacity range is from 500 M.T. to 10,000 M.T. or more.

### 2.2. DETAILS REQUIRED FOR COLD STORAGE PLANT

The valuer before inspecting the cold storage plants must have a basic knowledge about the following details to be collected for assessing the value of the plant.

### 2.2.1. GENERAL INFORMATION

Name, location and office address of the cold storage unit, approval of the scheme/ constructions from the competent authority. Details regarding crops being grown and quantity production and demand of the commodity in the area, Commodity to be stored. Location advantage of the unit, distance from the main market for the commodity, location of the nearest cold storage from this unit & its capacity, whether clearance has been obtained from Pollution Control Board and competent authorities for constructions, power connection.

### 2.2.2. LAND & BUILDING STRUCTURES

Area of the plot/ Site plan indicating the roads and the drainage, copy of the land records clearly indicating the title and cost, availability and suitability of water, water test report indicating the hardness of the water, availability of electricity at the site, other communication facilities. Soil test report for load bearing capacity of the soil, detailed specifications site development, storm water drainage systems, roads, boundary walls, building size details, layout plan of the structures, cost /quality / size of the insulation provisions, provisions for loading/ unloading of commodity in cold storage, arrangements for drying/ sorting/ grading of the commodity before/ after storage, analysis of the rates considered for preparing the estimates as per norms of State or Central PWDs for the prevailing year and any other relevant information.

## 3.0. PROJECT COST or CAPITAL INVESTMENT

For Project Cost made for the plant, the following item-wise costs are to be detailed. Item wise cost for Site Cost, site development, Civil structures and quantity of work analysis, Cost of machinery, Cost of miscellaneous equipments including office equipments, communication system fire fighting equipment etc, Electrification cost and Stand-by power arrangement cost, Cost for water supply systems such as well / bore-well, installation of pump-set, overhead tank, cooling water tower and piping works, Cost of Erection and Commissioning and any other arrangement / cost proposed may be described with proper details.

| **3.1. BROAD TECHNICAL PARAMETERS FOR A 5000 MT COLD STORAGE AS ON 2006** | |
|---|---|
| Land requirement | 2 acres |
| Storage space requirement | 17000 cubic metre |
| Technology preferred | Gravity circulation/ Bunker type/ Fin-coil |

| | |
|---|---|
| Cold storage room height | 12.2 to 18.5 m |
| Total Electrical load | 125 kW |

**3.2. TENTATIVE COST OF INVESTMENT AS ON 2006**

| Avg. cost of investment | Rs. per MT | Total Cost (Rs. lakhs) |
|---|---|---|
| Civil cost | 1600 | 80 |
| Insulation cost | 400 | 20 |
| Equipment cost | 1100 | 55 |
| Miscellaneous cost | 200 | 10 |
| **Total** | **3300** | **165** |

**3.3. TENTATIVE OPERATIONAL COST AS ON 2006**

| Operational cost | Rs./MT |
|---|---|
| Electricity & utilities | 210 |
| Establishment expenses | 35 |
| Maintenance and repair | 20 |
| Gas, Fuel and Lubricants | 10 |
| Labour charges | 15 |
| Insurance | 20 |

### 3.4. TECHNICAL SPECIFICATIONS

#### 3.4.1. LAND

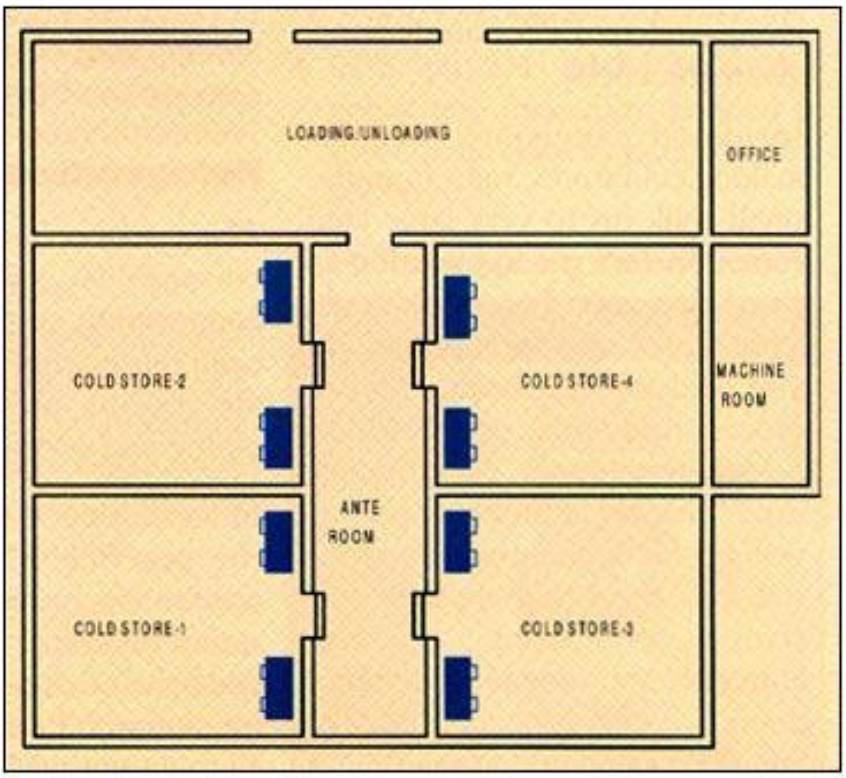
To set up a 5000 MT capacity cold storage unit one acre of land is adequate, but normally two acres of land is considered to take care of future expansions and waste management.

Agricultural land should not be used for construction of cold storage without converting it to non agricultural category. Soil test report for load bearing capacity of the soil, Items done under site development with detailed specifications, storm water drainage systems, roads, boundary walls, details of building clearly indicating the size of each building, layout plan for the proposed structures, provisions for loading/ unloading of proposed commodity in cold storage, arrangements proposed for drying/ sorting/ grading of the commodity before/ after storage and any other relevant information.

### 3.4.2. BUILDING

The storage space provision will vary according to the room height and technology being selected.

Normally, a provision of **3.4 m3 per MT of potato** is considered for finalizing the room size. This is the norm followed in India. For other commodities, space adjustment should be made with relation to their bulk density as compared to potato.



Typical Multi Floor, Multi Purpose Cold Store with Ceiling Mounted A.C. Units

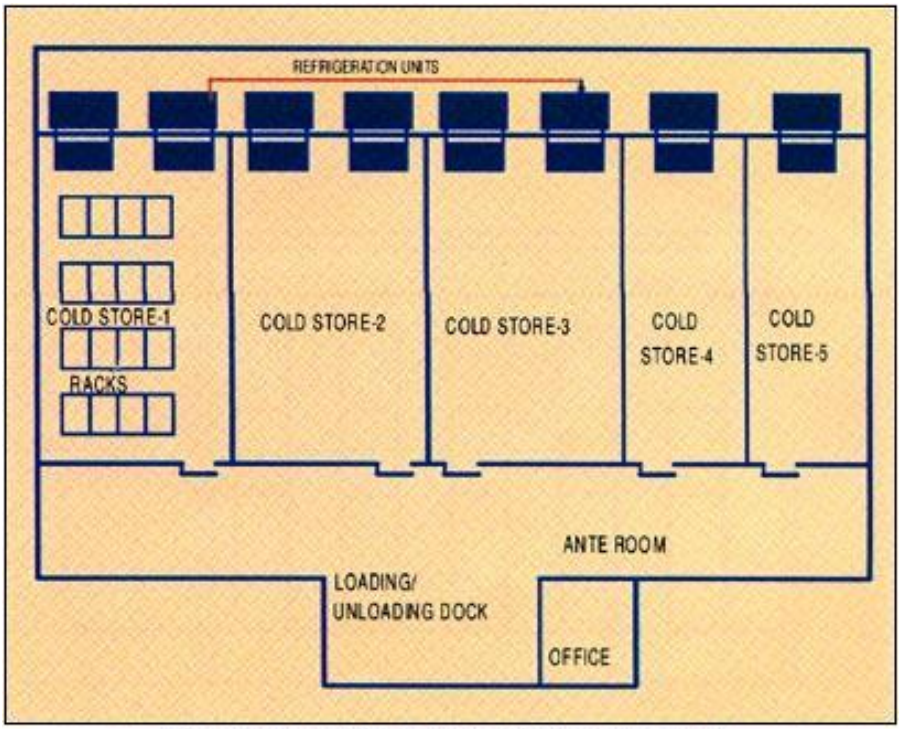
The conventional construction includes brick walls with RCC frame and a roof a with RCC slab. In India, in Uttar Pradesh, Bihar and Madhya Pradesh, the roofs are truss type with G.I. / A.C. Sheet covering. In the Southern states, the construction is carried out by RCC Framed Structure with four or more floors.

#### 3.4.2.1. MAIN COLD STORE BUILDING

The conventional construction including outer peripherals brick walls with RCC framed structure with RCC slab roof at the top floor is done. The girds of the RCC column are formed in a square pattern up to 2.50 metre to 3.00 metre grids. The RCC beams in each floor are either connected longitudinally or laterally and they are done alternatively in floors. No RCC roof at each floor level. The height of each floor depends on the height up to which the commodity can be stored and a clearance of 750 mm minimum for the cold air to circulate. Normally 2.75 metres to 3.50 metres will be height of each floor in a cold storage. The building is usually with a basement and four floors for a 5000 MT cold storage plant. Depending on the storage capacity and temperature the chambers are divided along the column grids for efficient operations

### 3.4.2.2. FLOORING

All the RCC beams in each floor are connected on the top, either with steel grating frame work or with wooden battened pallet platform floors. The wooden battens with a minimum size of 100 x 50 mm thick of about 450 mm long made of pest controlled and treated hard wood. They are joined with 50 mm x 50 mm wood scantling nailed with a minimum spacing of 75 mm gap between each batten and made as a wooden platform and placed over the beams. This acts as a floor and also loading area. The gap between the battens allows the condensed air for free flow as the air circulates around the agricultural commodity continuously. In some units, the battens are coated with poly urethane paints or with coal tar to prevent deterioration of wooden battens. In some units, the floors are connected with steel frame work (steel grating) instead of wooden batten flooring. In some of the recent units RCC battens and steel grating have also been used. The ground level floor will be RCC floor preventing percolation of water from below. The top floor roof will be RCC Flat slab construction with no beams as the cold air cooling condensers with blowers will be suspended from the roof. Other than the main cold storage doors with air curtains, there will be a staircase inside the cold room as well as externally, a balcony in each floor with a viewing panel, good lifts connecting all floors or Fork lifts and no windows are provided.



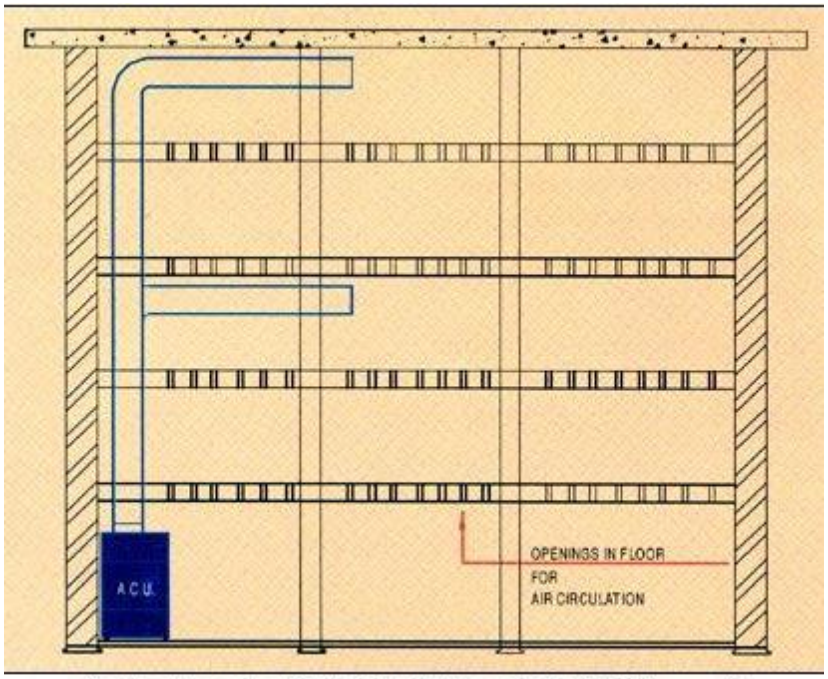

**Plan of Typical Cold Store with Pre-Insulated Panel Structure and Modular Refrigeration Units**

### 3.4.2.3. ANCILLARY STRUCTURES

The ancillary structures include the compressor room, RCC cooling tower, Power room, pump room, generator room, other utilities like toilets, stores, compound wall, drying yard, loading and unloading platforms. These structures will be of general building specifications as per I S Codes confirming to standard plinth area rates.

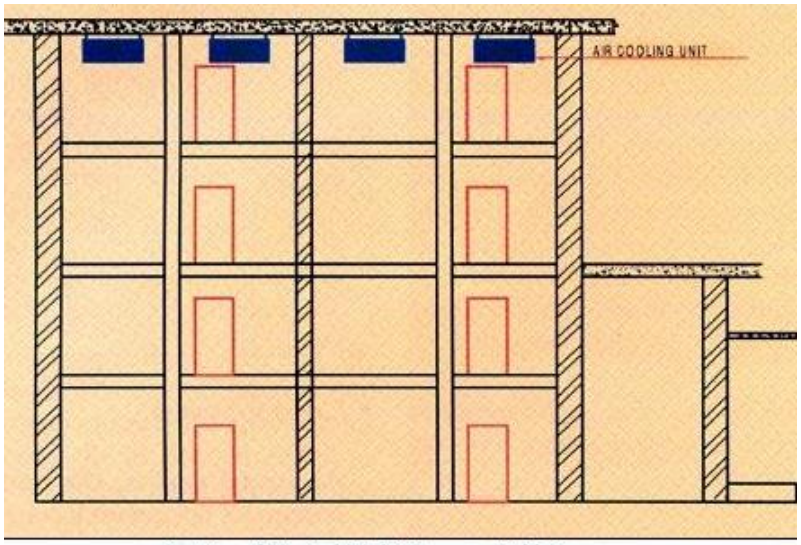
### 3.4.2.4. THERMAL INSULATION

In old units cheaper material like rice husk and cork were used as the thermal insulation. Now the better designed cold stores have been insulated with materials like Expanded Polystyrene, Fiberglass or Polyurethane. For thermal insulations, Poly urethane sheets are used on the inner side of the outer walls, centre common walls on both sides and on the ceilings and flooring depending upon the temperature prevailing in that areas. Whereas the insulation on walls and ceilings is finished with cement sand plaster in conventional cold stores, the latest trend is to use sheet metal cladding. The cladding materials are aluminium sheet or pre-coated galvanised steel sheet. A vapour barrier is provided to arrest moisture migration to the cold store. Barrier material (such as steel, aluminum, reinforced plastic sheets, metal foils, mastic type hot or cold application paints) is provided on the warmer side of the insulation



Section through a Typical Multi Floor Bulk Cold Store with Floor Mounted A.C. Unit with Ducting.

Prefab panels, also called as sandwich panels are now available in the market. These panels are structurally strong and have a better insulation value as compared to Expanded Poly Styrene panels for a given thickness. Similar construction is utilised for fabricating doors for the cold stores that air tight and strong compared to the conventional wooden insulated doors. However, in South India, the most commonly used insulation material is Poly Urethane Fibre (PUF) panels.



Section of Typical Multi Purpose Cold Store with Ceiling Mounted A.C. Units

Proper thicknesses of insulating material as designed are used for insulation of walls and roofs depending on the temperature prevailing in that area. Normally, two layers of insulating material are used for insulation. A minimum 100 mm thickness of high density PUF are used for sun facing walls and roof, whereas 80 mm thickness of PUF are used for other walls. Partition walls are insulated with 40 mm PUF and a thickness of 80 mm PUF for floors.

### 3.4.3. MAINTENANCE OF BUILDINGS AND MACHINERIES

The life of cold store buildings is limited due to the moisture permeation problem since ice forms in the bricks and causes them to deteriorate. Refrigeration engineers generally consider that cold store buildings have a life of not more than 40 years.

The repair of insulation is a constant problem due to moisture permeating the insulation and ice building up, often forcing the insulation away from the wall. It is generally expected that after a period of 15 years insulation should be removed from the walls and replaced.

The heaviest maintenance item in cold stores is the chamber doors. These rapidly deteriorate; they tend to freeze shut and have to be forced open. It is thought that the reasonable life of refrigerating machinery is about 25 years although equipments have been in operation for periods considerably longer than this. However, after 25 years it is probable that the machinery is no longer an economic proposition. Based on these facts, a conservative life period of 25 years is ideal for all practical purposes.

## 4.0. PROCEDURE FOR VALUATION OF COLD STORAGE PLANTS

The valuation of COLD STORAGE PLANTS will be usually prepared for the following purposes

1. **For financial Institutions for the purpose of**

   - **Primary Security**

     - Estimation of the building for project approval purpose
     - Certification of estimates for loan purpose
     - Stage inspection report for loan disbursement
     - Certificate for completion of the project

   - **Collateral Security**

2. **Cost of Construction for Income Tax purpose**

3. **Evaluation of Capital Investment**

4. **For availing subsidy from the Government**

5. **Market value say after five years**

## 4.1. ASSETS OF THE COLD STORAGE PLANT

### 4.1.1. LAND

- Land
- Fencing
- Drainage
- Site development
- Road
- Pavement

### 4.1.2. BUILDINGS

- Main cold storage
- Compressor room
- Stores
- EB transformer yard
- Security cabin
- Power room
- Drying area
- Generator room
- Cooling tower basin
- Office
- Toilets
- Loading bays and unloading bays

### 4.1.3. SERVICES

- Bore well
- pump and motor
- Water softening / treatment plant
- Sanitary works
- Over head tank

### 4.1.4. PLANTS & MACHINERIES

- Compressors Machinery
- Grading machines
- DG set
- Cooling tower air
- Weighing machines
- Waste disposal
- Loading machines / lift
- Electric supply EB Deposits
- Transformer

The Competent Valuers before arriving at a proper valuation of the cold storage plant must have thorough knowledge about the above mentioned details. The technical detailed analysis is required for these items individually so that the elucidation of the value of the project may be arrived accurately. Regarding the land, the valuer has to thoroughly check the Title Deeds of the lands, extent, size, shape of the land, Survey Sketch (FMB Sketch, Topo sketch), Encumbrance Certificate, approved plan by the Local Authorities, Pollution Control Board Order, Inspector of Factories and other revenue records. Status of site regarding use of land for non agricultural purposes must be ascertained. Agricultural land should not be used for construction of cold storage without converting it to non agricultural category.

### 4.2. DETAILS REQUIRED FOR VALUATION PURPOSE

- Total storing capacity of the plant
- Agricultural produce stored
- Type of storage - gunny bag, PVC tray, paper cartoon box
- Type of wood
- Method of storing - either in rack system or one over the above
- Size of the container in which the agricultural produce is stored
- Weight of the container inclusive of the agricultural produce stored
- Loading pattern
- Height up to which the storing done
- Temperature required for storing various produce
- Requirement of machinery
- Total load on the RCC framed Structure –on beams, columns and foundations
- Safe bearing capacity of the soil
- Thermal Insulation on walls, ceiling floor- type - thickness - specification
- Type and design of platforms at floor level -wood - Mild steel- RCC batons
- Treatment of wood – seasoned - pest controlled - coating applied
- Wood Batten details - spacing of wood reapers
- Type of joining – nailing - screwing - bolting - other types
- Loading bay

- ❖ Cold storage doors - single leaf - double leaf – Hinged - sliding
- ❖ Air curtains on doors
- ❖ Internal Staircase
- ❖ External Stairs
- ❖ Loading bay doors
- ❖ Ante-room size

## 5.0. METHODS OF VALUATION

The cold storage plant can be valued by the following methods. The method depends upon the purpose of valuation and it will vary for specific valuation requirement. Depending upon the nature of the requirement, suitable method may be adopted.

- **Plinth area method**
- **Rent capitalization method**
- **Detailed Estimation method**

### 5.1. PLINTH AREA METHOD

The plinth area rates as per CPWD / State PWD for the year of construction are derived for conventional buildings of standard technical specifications. They do not have proper rates for this special type of cold storage buildings.

The cold storage main building do not confirm to the plinth area rates, because of the typical structural design. The structure is a unique one. To determine the plinth area rate of the cold storage plant building, the factors attributing to the rates are: Total storing capacity, height of the building, either longitudinal beams or lateral beams in every floor with no RCC roof, the excess loading pattern of each floor for the required storage capacity and roof on the top floor only. Neither the CPWD / State PWD have not standardized the specification nor arrived at a specific plinth area rate. Hence to adopt plinth area rate method necessary adjustment has to be made judiciously and accordingly the rate has to be revised and adopted for arriving at accurate value.

The other ancillary buildings such as compressor, DG room, EB room, office, toilets and other buildings (confirming to standard technical specifications as per CPWD / state PWD) can be valued by plinth area method.

## 5.2. RENT CAPITALISATION METHOD

This method may be adopted when the rental income is known or assessed through local enquiry. Some of the cold storage plants are taken for lease or a portion or a floor is fully taken for rent for a specific period. Then, the rental income is derived for that particular area or floor and the same rate is adopted to arrive at the rental income for the full area. Some times, the rental income is based on the agricultural produce in weight measure (i.e.) in tonnes. The total tonnage stored may be calculated and the rental income based on weight measure is arrived for the full capacity. Normally, the storage capacity utilization is arrived at 70% to 80% on total capacity of the storage plant. The number of working days during the year is taken as 250.

The net income is derived from the storage plant for the year after all expenditures, repairs and maintenance of machineries and buildings, taxes and other levies paid during the year. A suitable average rate of return (MAY BE 8%) prevailing in the market for that year is calculated. Based on the market rate of return the value of the property by capitalizing the net income is arrived. This method is mainly based on the accounting pattern of the business and the balance sheet of the firm.

## 5.3. DETAILED ESTIMATE METHOD

The cold storage building has the most unconventional technical specifications. The live load at each floor level, design of RCC structures like foundations, columns, beams, roof leads to the only method of adopting Detailed Estimate method. It is by working out quantities of various items of works and multiplying with the relevant market rate of that items individually prevailing during the period of construction. Each item has to be identified with the quantity, nature of work executed. The rate component is arrived with respect to the local market rate of the materials, labour and machinery employed for that purpose after due analysis.

The live load for a cold storage building is adopted as a Uniform distributed load (UDL) 5.0 Kn / square metre (5000 kg/ sq m) of storage height with a minimum of 15 Kn/ sqm and concentrated load of 9.0 Kn/sqm as per the I S Code. It is more or less 5 times higher than the load defined for a normal office / hospital / college building. Neither

the CPWD / State PWD have not standardized the specification nor arrived at a specific plinth area rate.

The valuer on physical inspection can take the detailed measurements of columns, beams, slab, area of walls floor height and other details that can be seen with the naked eye. The details of concealed items are foundations, depth of foundations and steel reinforcements can be taken from the structural drawings. Or this may be worked back with load on the columns with the other details.

The invoices and purchase bills of materials, labour and other items involved during construction may also be used as supportive documents. As most of the cold storage plant's owners will apply for Central Government subsidy, they will account for the entire value for the construction.

This method can be adopted only when all technical parameters of the cold storage main building are available. Safe bearing capacity of the soil, detailed structural drawings for RCC Framed structure, loading pattern of every floor must be made available for arriving at a realistic value. The local market rate for cement, steel reinforcements, various sizes of stone jelly, transportation cost of materials, labour component and machinery deployed during construction and other details must be carefully identified and the rate for each item of work must be worked out. This Detailed Estimate Method will be nearest to the value of investment made or to be made for the execution of the project. This is the best suited method for estimating the cost of construction for Income Tax purpose.

## 6.0. PURPOSE OF VALUATION FOR FINANCIAL INSTITUTION

The purpose of valuation demands the nature of security offered to the financial Institutions and the property can be offered as Primary security or Collateral security.

If the Cold Storage Plant is offered as security to the financial Institutions, the valuer has to ascertain from the financial institution about the nature of security offered. The following observations have to be borne in mind by the valuer.

### 6.1. PRIMARY SECURITY

The borrower may seek financial assistance for Additional storage capacity in the plant, Procurement new plant & machineries for the replacement of old machineries / purchase of additional machineries / technology transfer for cold storage operation / reduce the direct expenditure in the zones of power, compressors, water consumption in the cooling tower / or other technical additions required for the plant operation. For this, infrastructure development, the property can be treated as a Primary Security for which the valuation of property is required

For the taking the cold storage plant as **Primary Security** the valuation of property can be done by land and building or by Rent Capitalization Method.

For Land and Building Method, the valuation of land is done by Comparable sale instances and for the building combined method of detailed estimate method for the unconventional main cold store building at the prevailing market rate of materials, labour components for the year of the report and ancillary buildings in plinth area method at the prevailing Plinth Area rates during the prevailing year. Suitable depreciation percentage if required may be considered for the building and the present value can be arrived.

### 6.2. COLLATERAL SECURITY

If the property is offered as collateral security, then the valuation by the rent capitalization method is adopted and compared with the land and building or detailed estimate method

Since the marketability of the property is questionable, the land and building method may be given for only for comparison purpose or avoided. The building is built for a specific purpose. The potential of the property depends on the promoters who intend purchase and to run the same business. Hence the value of the property is derived from the rent capitalization method.

The financial institution may be advised of the fact that the land and building method may not be ideal if the property is offered as collateral security. Or by comparing the estimated value by both rent capitalization method and land and building method, the

certification for a suitable market value can be given depending upon the prevailing demand.

The forced sale value will be 25 % to 50% depending upon the deterioration of the buildings, insulations, performance of the machineries and equipments, excess power consumption and poor cooling effect inside the plant.

### 6.3. MARKET VALUE SAY AFTER 5 YEARS

The Financial Institution may require Valuation report for additional loan assistance if the institution is willing to take this unit as security. The **present worth** of the property is arrived with value of the land, depreciated value of buildings and plants and machineries. The negative factors affecting the value of the property are location, less demand, less rate of return, building deterioration, obsolete machineries, excess power utilization, water treatment and other operational hazards. Based on the above facts, with a suitable percentage deduction for the negative factors, the forced sale value is arrived at and certified accordingly.

For calculating the value of the buildings the detailed method is followed for the specific year as per prevailing market rate of materials and labour components and suitable depreciation percentage is adopted and value is certified.

### 6.4. SUBSIDIES FROM THE GOVERNMENT

For availing the Subsidies from the Government and for evaluating the capital investment, the estimated cost is arrived with the land cost as per the title deed (inclusive of stamp and registration charges as per registration department). The cost of construction of the storage building is by detailed estimate method. The utility structures are by the plinth area method as per the prevailing rates. The plants and machineries cost as per invoices after verification for genuineness. The total estimated cost is arrived at by adding the above all and certified.

### 6.5. DEPRECIATION

The wear and tear of the machineries are due to constant running, the structural strength of the building due to moisture permeation, corrosion factors attributed towards steel reinforcements and perishable agricultural produces, it is assumed that

the life of a cold storage plant is 40 years. The repair of insulation due to moisture penetrating the insulation, often forces the insulation away from the wall. It is generally expected that after a period of 15 years insulation should be replaced.

The heaviest maintenance item in cold stores is in respect of chamber doors and the wooden batten floors. These rapidly deteriorate. Hence, it is advisable to consider for the valuation purpose, the reasonable life of cold storage plant is for about 25 years although many plants have been in operation for periods considerably longer than this. However, after 25 years it is probable that the machinery is no longer an economic proposition

Based on the above facts, conservative life of the building may be arrived at to a maximum of 25 years. There is no hard and fast rule for this. The valuer must inspect the unit and find out the depreciated value of the structures, insulation materials, and condition of the brick walls, cold storage doors, cooling tower, and other ancillary structures which are subjected to water / moisture permeation. After assessing the above details the depreciation percentage may be arrived.

Considering the above facts, for the purpose of arriving at the present value of the plant, the deprecation percentage is ascertained based on the future life of the building and plant on inspection of the building and machineries.

## 7.0. CASE STUDY - VALUATION OF A 4000 MT COLD STORAGE PLANT

A model valuation report of 4000 MT cold storage plant is given as a case study.

### 7.1. PURPOSE OF VALUATION

The valuation of 4000 MT COLD STORAGE PLANT is done is to ELUCIDATE THE COST OF CONSTRUCTION FOR INCOME TAX PURPOSE

#### 7.1.1. INTRODUCTION

Pursuant to the request from ------Company, Ariyalur, the property at S F Nos-------, Sendurai Road, Ariyalur Village & Taluk, Perambalur District, Tamil Nadu, reported to be owned by ------COMPANY, ARIYALUR, was inspected by me on --TH ------ 2007 for the purpose to ELUCIDATE the COST OF CONSTRUCTION of Cold Storage Plant

### 7.1.2. DETAILS

Name & address of the plant: M/S ----- Cold Storage Plant, S F No ---Sendurai Road, Ariyalur and the period of Construction as reported is from July 2000 to September 2001.

The assessee has constructed at the above mentioned property a cold storage unit with a basement, ground, three upper floor building along with ancillary structures like compressor room, rest room, RCC cooling water basin, compound walls all-round, bore-well and toilet.

The purpose of Cold Storage is to store for seasonal multi agricultural commodity like coriander seeds and red chilly. The capacity of the cold store is 4000 metric tonnes.

### 7.1.3. DETAILS OF THE PROPERTY

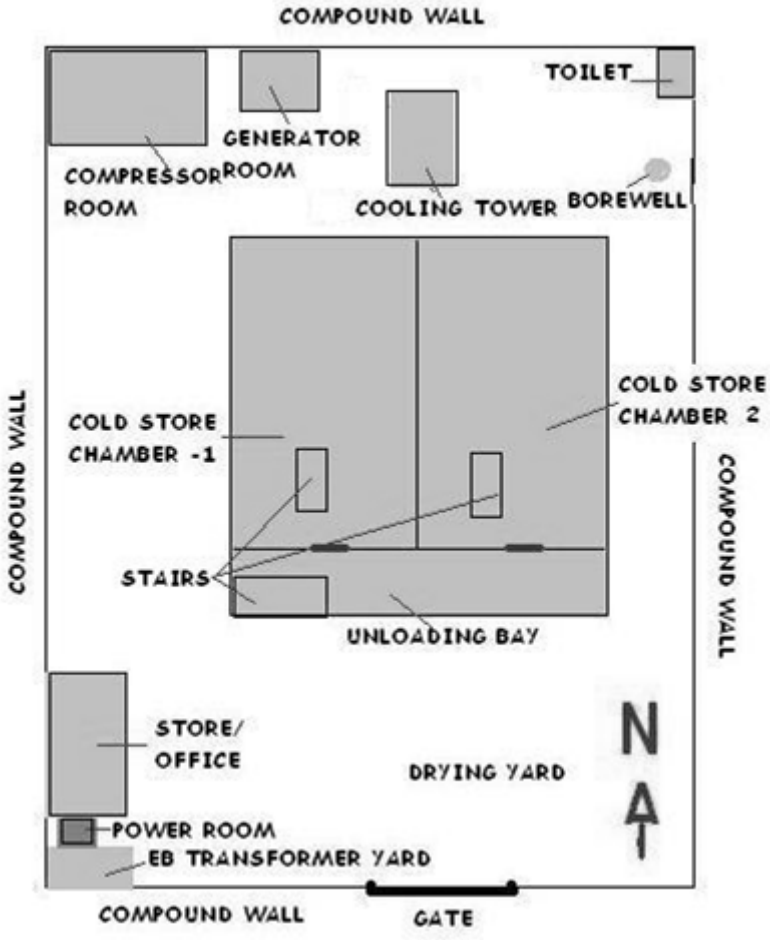
| | |
|---|---|
| **LAND** | 2.01 Acres |
| **PLINTH AREA OF BUILDINGS** | |
| ❖ Main Cold Store 14.85 metre height | 915.82 square metre |
| ❖ Compressor & DG room | 106.05 square metre |
| ❖ Rest room (store / office) | 13.20 square metre |
| ❖ RCC Cooling Tower | 94000 litres capacity |
| ❖ Compound wall | 273.99 running metre |
| ❖ Bore well | 150 mm dia 125 feet deep |
| ❖ Toilet block | 12.05 square metre |

### 7.1.4. TECHNICAL SPECIFICATION

The main cold store building is a RCC Framed Structure with basement, ground and three upper floors above ground floor.

The main building consists of two big halls separated by a longitudinal central wall.

Front portion of the building is the enclosed loading and unloading bays and used for preliminary drying of agricultural produce before put in to cold storage area.




The access to floors of the cold storage area is through a staircase provided internally. A staircase in the front gives access to the balconies of various floors.

Further to this, there are ancillary structures like Compressor machinery room, Generator room, Store for consumables, Cooling tower basin, EB transformer yard, Office, Security cabin and Toilets.

All structures are RCC framed Structures.

For the main storage buildings, RCC columns of 300 mm x 300 mm size are laid at 2.45 metres intervals on both directions.

The foundations are isolated column foundation at a depth of 1.52 metres below ground level.

The basement of main storage hall Is 1.20 metre below the ground level.

The floor height is 2.97 metres.

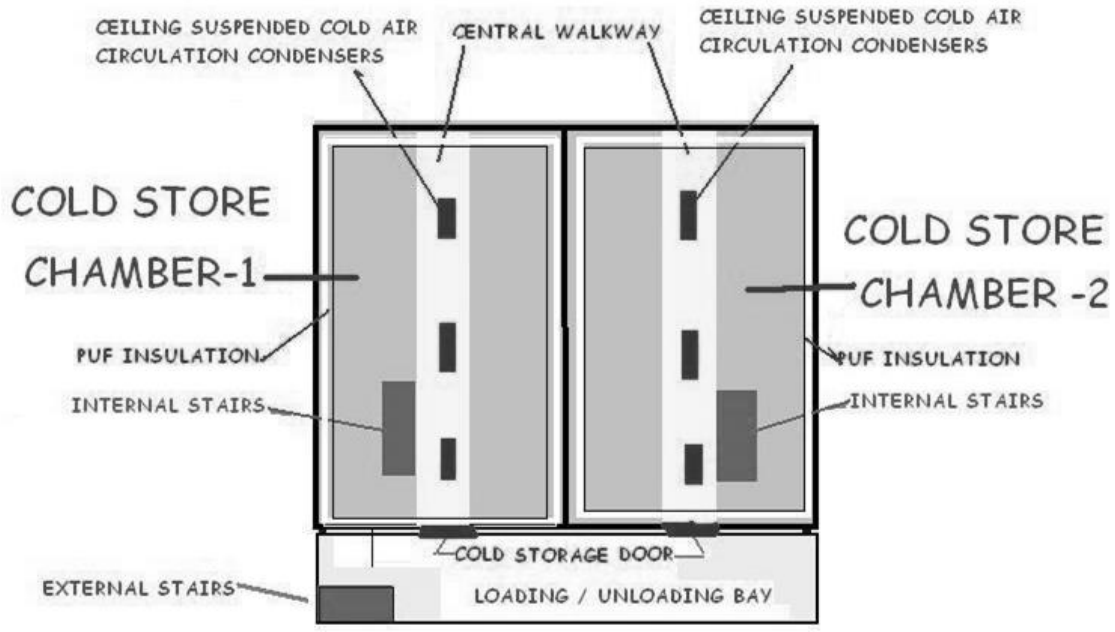
At every floor level at 2.97 metres RCC beams connect the columns in only one direction either laterally or longitudinally at every floor level alternatively.

The top roof is RCC flat slab type roof with 100 mm thick with weathering course.

Superstructure is brickwork on outer and central wall that bifurcate the two cold storage chamber halls and are plastered.

Basement floor flooring in cold storage hall is with RCC floor.

The intermediate floor flooring is laid with seasoned treated pest controlled wooden batten. This batten floor is laid with a clear gap of 50 mm nailed with 100 mm x 50 mm thick country Palme rah wood scantlings.




COLD STORAGE PLANT INTERNAL LAYOUT

The thermal insulation on walls are 125 mm thick for ceilings, 100 mm for outer walls, 50 mm on both sides for centre wall and flooring in basement is insulated with 80 mm thick PUF insulation.

The doors to the cold storage is through PUF coated insulated hinged steel doors 75 mm thick with an air curtain blower machinery placed above the doors to prevent the loss of cold air while opening of the doors.

The air cooling is done by ammonia gas compressor plant situated behind the main building.

Four suspended air cooling condensers with motor are erected at the top most point in the ceiling inside each chamber in cold storage area which caters the cool air supply up to the basement for all floors.

A cooling tower with RCC cooling tower basin behind the main building recycles and maintains the cool air inside the cold storage. The RCC cooling water basin is in RCC walls with RCC bottom slab.

114 HP power supply is obtained from T N E B through an indoor transformer unit. A standby 125 KVA generator set is made available for uninterrupted power supply.

The property is bounded by a compound wall all-round with an entrance gate on the road side.

The front drying yard is done with RCC cement concrete floor.

Water supply is by the 150 mm diameter bore-well 125 feet deep. There is a toilet in the rest room below the outer staircase.

**7.2. METHOD ADOPTED FOR VALUATION**

The DETAILED ESTIMATE method is adopted for the MAIN COLD STORAGE AREA since all technical parameters of the cold storage main building are available.

The other ancillary buildings such as compressor, DG room, EB room, office, toilets and other buildings confirming to standard technical specifications as per CPWD / state PWD are valued by Plinth area method.

For the main building, the detailed structural drawing has been verified with RCC column foundations, columns size, spacing of columns, beams, slabs, loading pattern of

every floor and other items as per the specifications mentioned in the approved drawing issued for execution of the project.

Plans submitted for approval to the local bodies and other particulars required for estimation of the cost of construction are taken in to account.

The local market rate for cement, steel reinforcements, bricks, sand, various sizes of stone jelly, other construction materials, materials transportation cost to that particular project has been ascertained for the reported period of construction and the costs have been worked out for each item of works.

Labour component and machinery deployed during construction and other details are carefully identified and the rates for each item of work are worked out in conjunction with bills submitted by the Assessee.

The item wise rates are arrived for the specific period corresponding the construction period of July 2000 to September 2001.

The unit rates thus worked includes a contractor's profit of 7.50% and overhead expenses of 2.50%.

As the assessee has done the execution under his direct supervision and procured the construction materials by himself, the 7.50% contractor's margin is deducted.

An addition of 1.50% on the estimated value is envisaged for employment of technical assistance sought for preparation of drawings and technical supervision of the project

For want of space, the detailed estimate of items of works has not been included in this report.

The general abstract for cost of construction for the cold storage plant for the reported period of construction is enclosed herewith.

This Detailed Estimate will be nearest to the value of investment made for the execution of the project.

**7.3. COST OF CONSTRUCTION OF COLD STORAGE PLANT MAIN BUILDING**

| No | Description | Quantity | Unit | Rate | Amount in Rupees |
|---|---|---|---|---|---|
| 1 | Earthwork excavation- basement | 1605 | cum | 99.22 | 1,59,248 |
| 2 | Earthwork excavation-foundation | 906 | cum | 101.44 | 91,905 |
| 3 | River Sand filling | 73.39 | cum | 231.29 | 16,974 |
| 4 | PCC 1 : 5 : 10 grade concrete | 227 | cum | 1397.87 | 3,17,316 |
| 5 | RCC 1 : 2 : 4 grade concrete | 649.12 | cum | 2196.57 | 14,25,838 |
| 6 | Centering & shuttering formwork | 6114.67 | sqm | 119.58 | 7,31,192 |
| 7 | Steel reinforcements | 83453 | kg | 24.65 | 20,57,116 |
| 8 | Brickwork in C M 1: 5 | 471.10 | cum | 1680.31 | 7,91,594 |
| 9 | 4 ½'' brickwork wall | 166.28 | sqm | 213.45 | 35,492 |
| 10 | Wood work in doors & windows | 9.52 | sqm | 2000 | 19,040 |
| 11 | Cement concrete floor | 1287.26 | sqm | 233.27 | 3,00,279 |
| 12 | Plastering of walls | 6508 | sqm | 53.46 | 3,47,918 |
| 13 | Rough cast plaster | 130 | sqm | 136.68 | 17,768 |
| 14 | Ceiling plaster | 291 | sqm | 43.37 | 12,621 |
| 15 | White washing | 5652 | sqm | 5.04 | 28,486 |
| 16 | Nailed Country wood flooring in 50mm x 100mm & 50mm x 50mm reapers resting on beams | 4324 | sqm | 588 | 25,42,512 |
| **TOTAL COST OF MAIN STORAGE PLANT** | | | | | 88,95,299 |

| 7.4. COST OF CONSTRUCTION OF ANCILLARY STRUCTURES | | | | | |
|---|---|---|---|---|---|
| **No** | **Description** | **Quantity** | **Unit** | **Rate** | **Amount in Rupees** |
| 1 | Compressor room | 106.05 | sqm | 4535 | 4,80,937 |
| 2 | Rest room | 13.20 | sqm | 3483 | 45,976 |
| 3 | RCC cooling water basin | 94000 | litre | 4.50 | 4,23,000 |
| 4 | Toilet Block | 12.05 | sqm | 3165 | 38,138 |
| 5 | Compound wall | 273.99 | r.m. | 1615.46 | 4,42,620 |
| 6 | MS Gates | 13.73 | sqm | 1000 | 13,730 |
| 7 | Ceramic tiles in toilet | 4.13 | sqm | 450 | 1,859 |
| 8 | PVC Syntax tank | 500 | litre | 4.50 | 2,250 |
| 9 | Septic tank | 3300 | litre | 2.00 | 6,600 |
| 10 | Water supply & sanitary | Lump sum | | | 5,000 |
| 11 | Bore well | Lump sum | | | 25,000 |
| **TOTAL COST OF ANCILLARY STRUCTURES** | | | | | **14,85,110** |

| 7.5. ABSTRACT | |
|---|---|
| VALUE OF MAIN STORAGE PLANT | 88,95,299 |
| VALUE OF ANCILLARY STRUCTURES | 14,85,110 |
| TOTAL VALUE OF CIVIL WORKS | 1,03,80,409 |
| Less : 7.50 % towards self supervision | -7,78,530 |
| **Total** | **96,01,879** |
| Add: For preparation of drawings, approval @ 1.50 % | + 1,55,706 |
| **TOTAL ESTIMATED COST OF CIVIL WORK FOR IT PURPOSE (COST OF CONSTRUCTION)** | **97,57,585** |

## 7.6. CERTIFICATE

Based on the above details and also particulars provided, this ELUCIDATION report has been prepared and furnished. After careful considerations to the important factors I am of the opinion that the estimated cost prepared on above lines is as assessed as per the statements attached herein PROBABLE COST OF CONSTRUCTION of the Buildings is Rupees 97.58 lakhs

## 7.8. REMARKS

The adopted item-wise unit rate is based on the local prevailing market rate of materials, labour component and transportation cost during the year of construction and in conjunction with the invoices submitted. The prevailing market rates are ascertained by local enquiries. Value varies with the purpose and time. This value should not be referred for any purpose other than mentioned.

## 8.0. CONCLUSION

To summarize, the valuer should exercise proper judgment for the nature and design of the cold storage unit and depreciation percentage to be adopted for the present condition and derive the value of the plant.

The percentage, to which the value of the cold store is depreciated, will depend on the particular cold store's construction quality, specifications and nature of storage materials.

It will vary from one unit to another and the valuer must have definite information collected with regards to the specifications of the unit.

Since the marketability of the property is questionable, and the building is built for a specific purpose, the market potential of the property depends on the promoters who intend purchase and to run the same business. The valuer must bear in his mind on this factor and certify accordingly.

And finally, the valuer by his own judgment has to choose the appropriate valuation method for a fair value for the required purpose of valuation depending on the nature of unit and security purpose.