
Maxcool
Energy Efficient & Eco Friendly

CONTROLLED ATMOSPHERIC STORES (CAS)

Why CAS (Controlled Atmospheric Storage):

- The rising prevalence of diabetes and other medical conditions in the country, coupled with a growing emphasis on health, has led to an increased demand for fruits and juicy vegetables. This shift has created a need for year-round availability of these products in their fresh state.

- Fruits such as apples, grapes, oranges, pomegranates, mosambi, kiwis, and fruit lemons are in high demand throughout the year.

- Controlled Atmospheric Storage (CAS) provides an effective solution for preserving these fruits year-round. Utilizing advanced technology, which has been a hallmark of developed nations, this approach ensures optimal practices for prolonging the freshness and quality of juicy fruits.

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- India produces approximately 27 lakh metric tons of apples annually, yet the storage capacity currently stands at only 50,000 metric tons. As a result, farmers are unable to maximize their earnings, and fruits are unavailable year-round due to insufficient storage.

- A typical Controlled Atmosphere (CA) storage facility, capable of housing 2,500 metric tons, costs between Rs. 25 to Rs. 30 crores, excluding the cost of the building. While a few such stores have already been established in the country, many more are planned for development.

- CAS systems do more than just regulate temperature; they also control humidity, nitrogen levels, and specific concentrations of oxygen and carbon dioxide to preserve the quality of harvested fruits and vegetables.

- To promote this technology, the Government of India offers subsidies ranging from 30% to 100% for these projects. This initiative will not only help consumers by ensuring year-round availability of fresh produce but also enable farmers to achieve better prices for their harvests.

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Current Status:

- As of today, India requires approximately 3,000 to 5,000 Controlled Atmosphere (CAS) storage facilities, each with a capacity ranging from 250 to 500 metric tons, to meet the country's demand. This expansion would enable the storage of juicy fruits to increase from the current 1.5% to 20%.

- Currently, there are fewer than 25 operational CAS facilities in the country.

- For a typical CAS, a minimum floor area of 40,000 square feet is required, capable of storing between 120 to 250 metric tons. The land requirement for such a facility is approximately 1 acre, with an additional 0.5 acres designated for construction, specifically for a 120 MT capacity store. One acre of land ensures the free movement of materials and vehicles within the facility.

- CAS storage requires about 50% more space than traditional cold storage, leading to increased costs for Pre-Insulated Panel (PUF) rooms and cooling units. This additional space requirement contributes to higher overall infrastructure and operational costs.

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Basic Specifications:

- To ensure optimal utilization, the walls of the PUF panels must be gas-tight. Any leaks or inefficiencies can result in increased storage costs.

- The storage facility can be divided into smaller blocks, typically of 30 to 50 metric tons, to enhance flexibility and efficiency in managing the stored produce.

- Additionally, the facility can accommodate a combination of fruits and vegetables, optimizing the available storage space and improving overall operational efficiency.

- For best results, it is recommended that the CAS facility be located within 12 to 24 hours of the harvest location. This proximity ensures safe transportation and minimizes the risk of spoilage, preserving the quality of the stored produce.

CONTROLLED ATMOSPHERIC STORES

About us.

Maxcool Technologies India Pvt Ltd specializes in Air Conditioning and Refrigeration Applications since last 23 years.

- Our Expertise - Experience in execution of projects for Cold Room, Chillers,Industrial cooling applications ranging from + 5 to – 30 Deg Cent.
- Supplied equipment for deep sea applications .
- In CAS, segment have built indigenous technology. International technology indigenized with applications based on AI platform., and climate control .
- Strong R&D team with over 1000 years of man experience , to fabricate, install and maintain
- Experienced team on board for efficient management of CAS technology and offer best of the quality for customers.

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Why Invest in CAS:

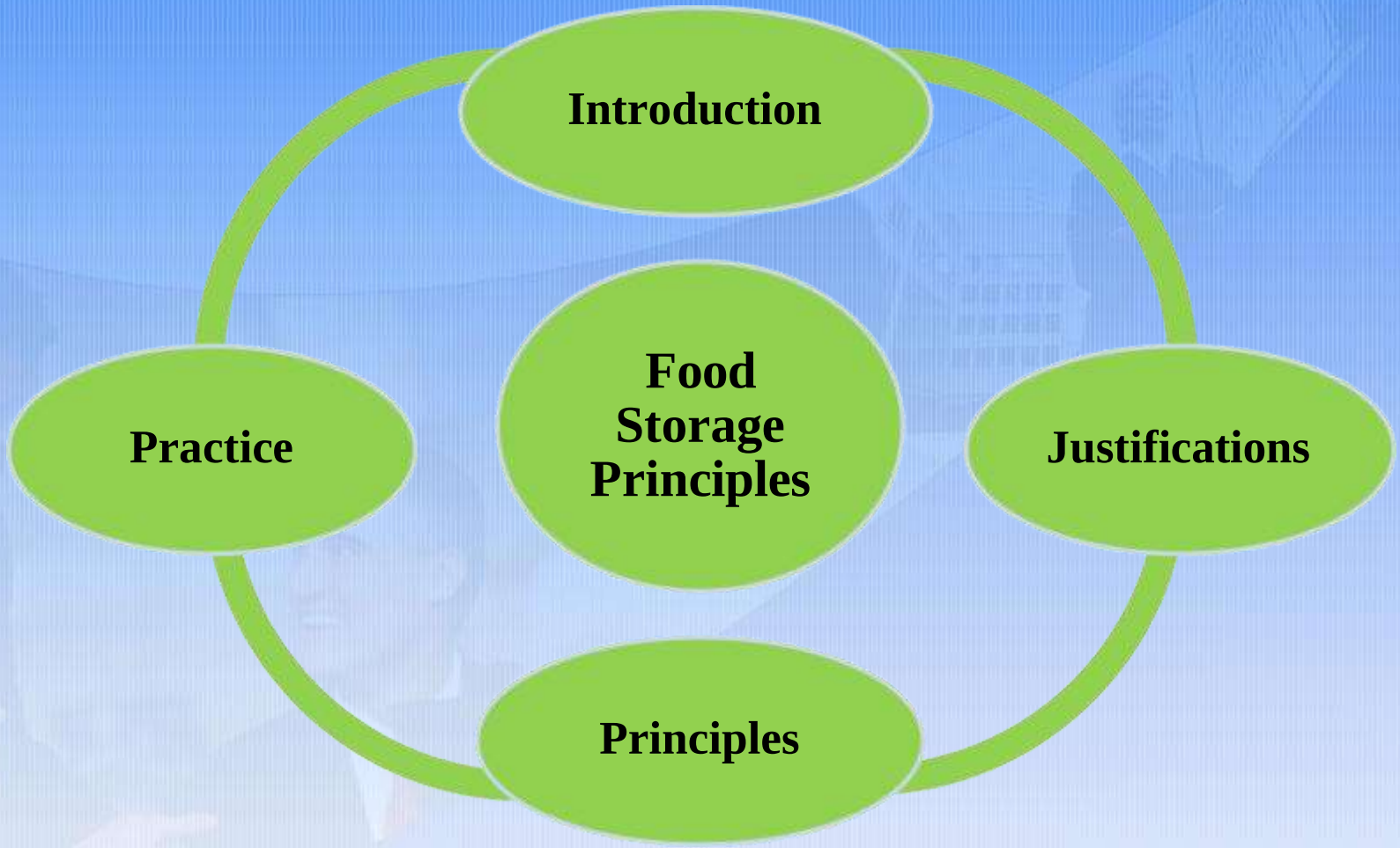
- It is estimated that Controlled Atmosphere (CA) stores can achieve break-even within 2 to 3 years. The variation in the break-even period is largely dependent on factors such as crop patterns and effective business planning and strategies.

- Maxcool Technologies India Pvt. Ltd., in addition to manufacturing and installing CAS, also offers consultancy services to ensure smooth and trouble-free operations of these systems for a minimum of 20 years.

- We provide value addition through expert guidance on building, operations, and strategic management of CAS.

- This presents an excellent opportunity for the investor community to invest in CAS for passive income, potentially yielding returns over the next 15 to 20 years.

OUTLINE


Introduction
Practice
Food Storage Principles
Justifications
Principles

FRESH PRODUCE

IMPACT ON FRESH HARVEST WITHOUT CAS:

- Fresh harvests are susceptible to quality changes, which may include alterations in nutrient levels, color, the development of off-flavors, or a loss of texture. These changes can impact the overall freshness and market value of the produce.

- CAS (Controlled Atmosphere Storage) helps in the precise control of atmospheric gases such as oxygen, carbon dioxide, and ethylene within the storage environment. By regulating these gases, CAS slows down the ripening process, preserves the quality of the produce, and extends its shelf life, ensuring fruits and vegetables remain fresh for longer periods.

- The above process helps in extending the storage life of fruits and vegetables by slowing down their natural ripening and deterioration processes. By controlling the levels of oxygen, carbon dioxide, and ethylene, CAS preserves the freshness, texture, flavor, and nutritional value of the produce for a longer period, ensuring better quality and reduced wastage.

FATE OF PROCESSED FOODS

Canned foods or dried foods, are processed in such a way that they may be kept at ambient temperature with no loss in quality.

Food deteriorates soon after harvest

Causes of Quality Degradation in Fruits and Vegetables:

The degradation of fruits and vegetables is primarily driven by several factors:

1.Chemical Breakdown: Food components undergo chemical breakdown catalyzed by energy, light, or water, leading to the deterioration of quality.

2.Enzyme Activity: The presence of enzymes plays a significant role in causing reactions that can negatively affect product quality, including:

- **Flavor changes**: Enzymes like lipoxygenase, lipases, and proteinases contribute to the production of undesirable flavors.
- **Textural changes**: Enzymes such as peptic enzymes and cellulases can cause alterations in the texture of the produce, making them softer or mushy.
- **Color changes**: Enzymes like polyphenol oxidase, chlorophyllase, and peroxidase can result in discoloration, such as browning or fading of color.
- **Nutritional Loss**: Enzymes such as ascorbic acid oxidase and thiaminase can lead to a reduction in essential nutrients, like vitamin C and thiamine.

These biochemical processes can significantly impact the freshness, appearance, and nutritional quality of fruits and vegetables, making effective preservation methods like CAS essential.

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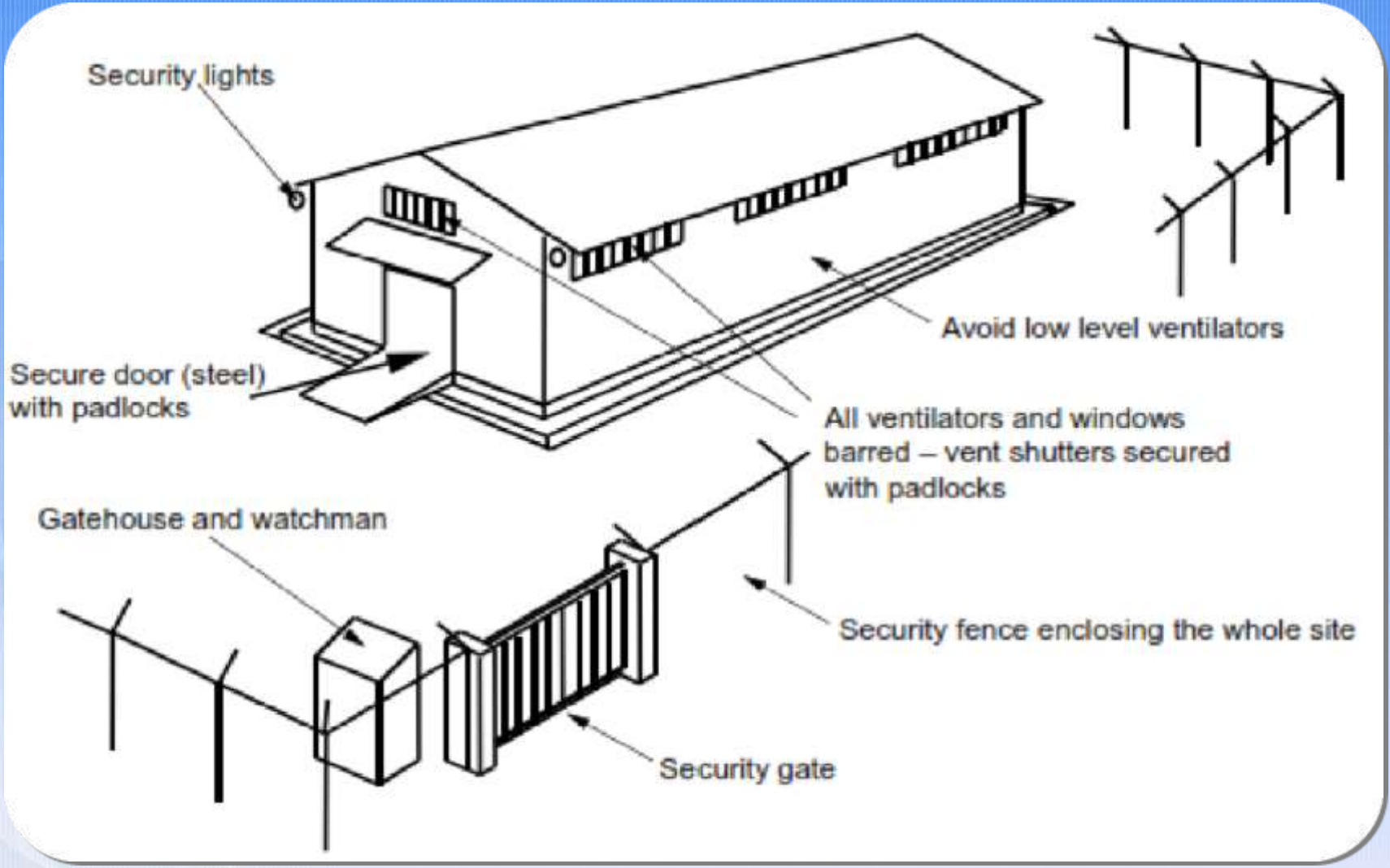
Insect and Rodent Attacks:

- Insect and rodent infestations, and the associated losses, occur easily in open fields during growth and production, as well as in bulk storage facilities that are exposed or partially exposed to the environment.
- Rodents cause significant damage, often far exceeding the amount of food they consume, by contaminating it with droppings, filth, hair, and by facilitating the transmission of diseases. This not only leads to direct loss of produce but also compromises its safety and marketability.

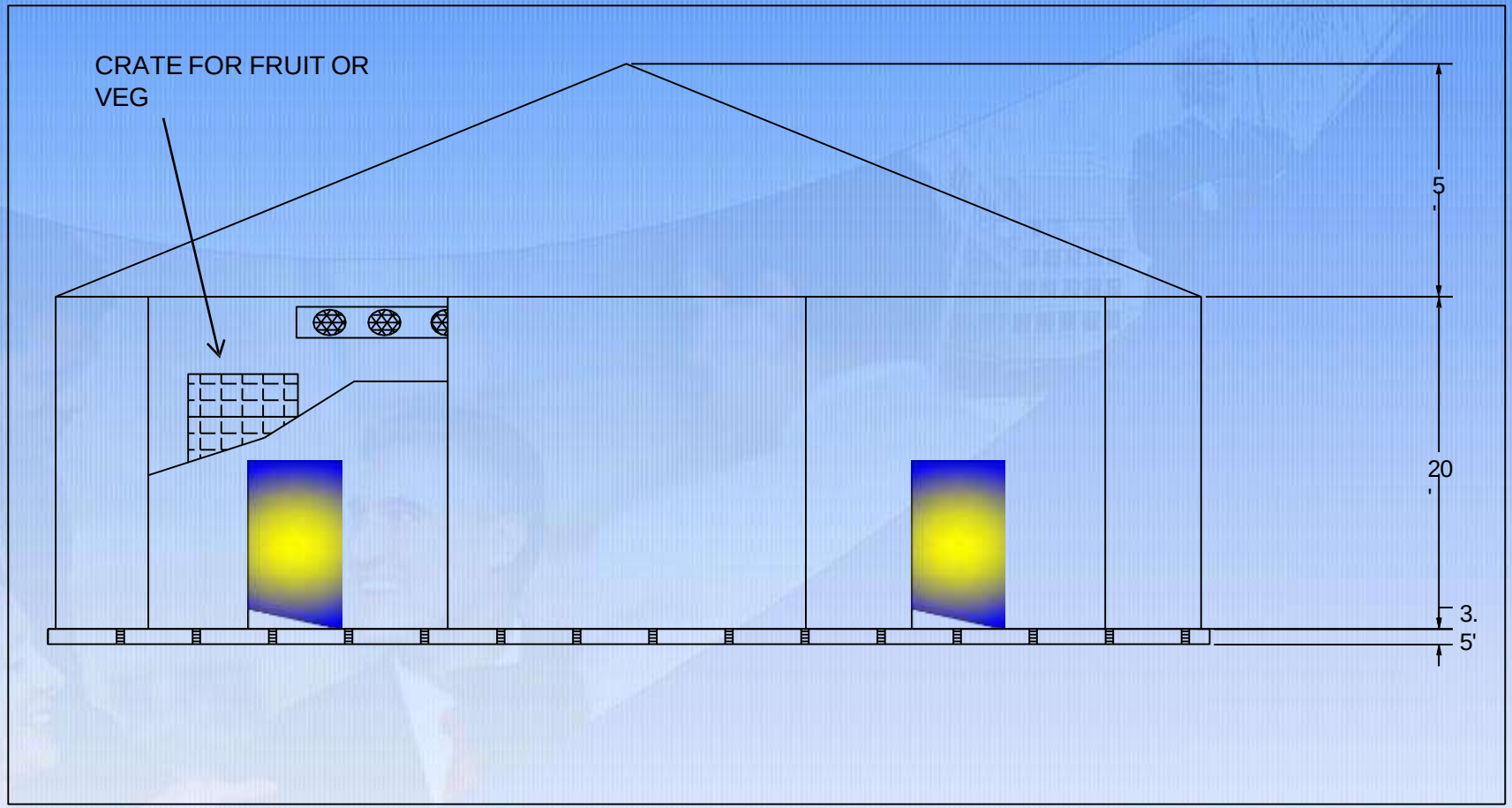
Biological Interactions and Post-Harvest Losses:

- Oxygen (O_2) acts as an initiator of chemical reactions that can be detrimental to various food constituents, such as lipids, vitamins, pigments, and certain amino acids. Exposure to oxygen accelerates degradation, resulting in nutritional and quality loss.
- Furthermore, reduced oxygen levels can impair the physiological functions of food tissues, including those in fruits, vegetables, and meat, leading to diminished freshness, texture, and overall quality. Managing oxygen levels effectively is essential for prolonging the shelf life and preserving the nutritional value of these products.

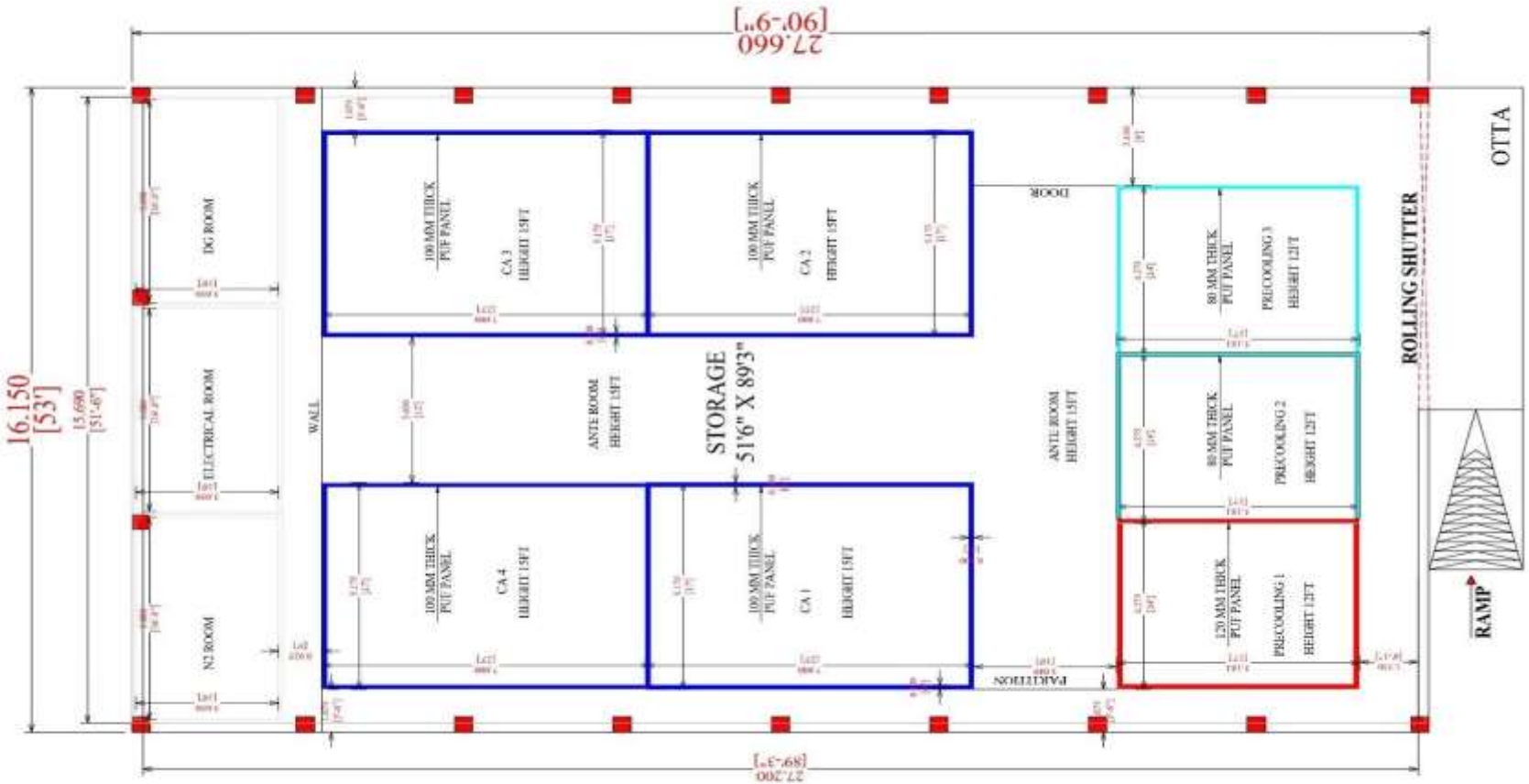
CA -Store design with respect to security



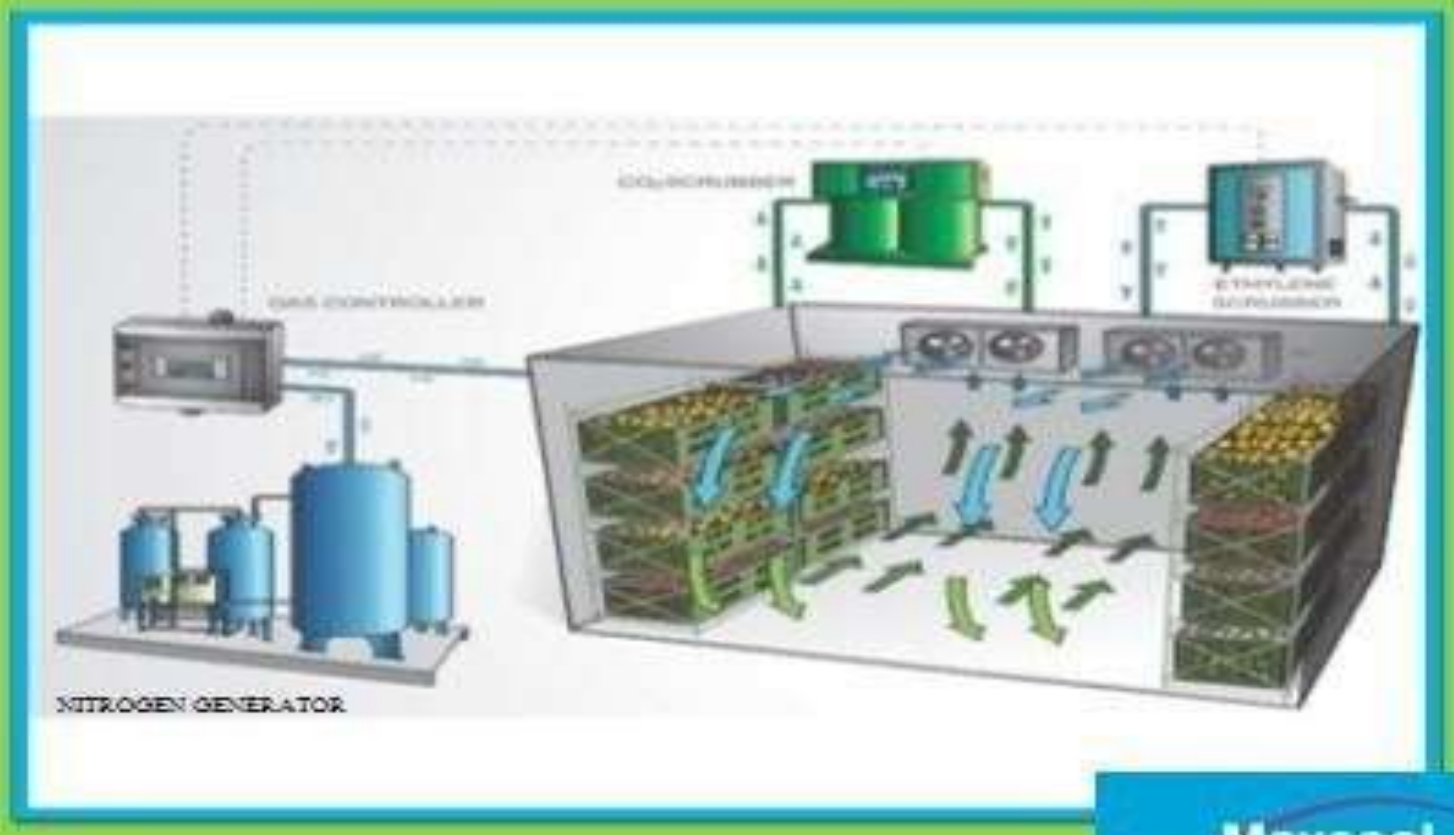
CA STORE- CONSTRUCTION FRONT VIEW



CA STORE – CONSTRUCTION TOP VIEW



CA STORE-OPERATION VIEW



CAS WITH RESPECT TO MAHARASHTRA

Maharashtra has a significant advantage, producing four out of seven major juicy fruit crops. However, the state currently lacks Controlled Atmospheric Storage (CAS) systems to effectively preserve these fruits.

To address this gap, we propose the establishment of CAS facilities at the following five strategic locations, aimed at benefiting farmers in Maharashtra by improving storage and ensuring year-round availability of fresh produce:

1. **Amravati** – Focused on Orange storage
2. **Nasik** – Catering to Grapes and Pomegranates storage
3. **Sholapur** – Dedicated to Pomegranates and Mosambi storage
4. **Ratnagiri** – Primarily for Mangoes storage
5. **Srigonda** – Focused on Lemon and Mosambi storage

Annexure I will provide a detailed summary of the proposed locations and their respective benefits.

CA STORES- MAHARASHTRA

MAHARASTRA CITRUS FRUITS SUMMARY Annexure I

SR. NO.	LOCATION	ITEM	TOTAL PRODUCTION	NO. OF SEASONS	MONTH OF SEASONS
1	NAGPUR	ORANGES	816.845 MT	2 SEASONS	OCTOBER - JAN END
	AKOLA		PER YEAR		FEB - MID MAY
	AMRAVATI				
	WARDHA				
2	SHRIGONDA	LEMON	441.857 MT	2 SEASONS	NOVEMBER TO
	SOLAPUR	MAUSAMBI	PER YEAR		JANUARY
	JALGAON	(SWEET LIME)			
3	SOLAPUR, NASIK	POMEGRANATES	17.48 LAKHS MT.	1 SEASONS	SEPTEMBER -
	AHMEDNAGAR,		PER YEAR		DECEMBER
	PUNE, SANGLI,				
	DHULE, LATUR,				
	USMANABAD				
	JALNA, PARBANI				
	AURANGABAD,				
	BEED , SATARA				
4	RATNAGIRI	MANGO	522.177 MT	1 SEASONS	MARCH - JUNE
	DEVGAD		PER YEAR		
5	NASIK	GRAPES	25 LAKH MT	1 SEASONS	FEBRUARY -
		POMEGRANATES	PER YEAR		APRIL

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